1143

RETINOSCOPY

(OR SHADOW TEST)

IN THE

DETERMINATION OF REFRACTION AT ONE METER DISTANCE, WITH THE PLANE MIRROR

BY

JAMES THORINGTON, M.D.

ADJUNCT PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC AND COLLEGE FOR GRADUATES IN MEDICINE; OPHTHALMOLOGIST TO THE VINELAND TRAINING SCHOOL FOR FEEBLE-MINDED CHILDREN; OPHTHALMOLOGIST TO THE M. E. ORPHANAGE; LECTURER IN THE PHILADELPHIA MANUAL TRAINING SCHOOLS, 1896–7, ON THE ANATOMY, PHYSIOLOGY, AND CARE OF THE EYES; RESIDENT PHYSICIAN AND SURGEON PANAMA RAILROAD CO., ISTHMUS OF PANAMA, 1882–1889, ETC.

TWENTY-FOUR ILLUSTRATIONS

PHILADELPHIA

P. BLAKISTON, SON & CO.

1012 WALNUT STREET

1897

PRESS OF WM. F. FELL & CO.,
1220-24 SANSOM ST.,
PHILADELPHIA.

PREFACE.

At the earnest solicitation of many students and friends, this book is presented as an abstract of the author's previous writings and lectures on Retinoscopy, delivered during the winter course on Ophthalmology, at the Philadelphia Polyclinic.

In presenting a manual of this kind the writer does not presume to detract from the writings or teachings of others, or the excellent work on Skiascopy, by his friend and colleague, Dr. E. Jackson; but wishes to elucidate in as concise a manner and few words as possible the method of applying retinoscopy, which has given most satisfaction at his hands.

While intended for college students and post-graduates, yet there is ample material given whereby the ophthalmologist at a distance may acquire a working knowledge of the method, by study and practice in his own office.

For three reasons Retinoscopy, in preference to Skiascopy, has been chosen as the title; namely, that

it may not be confounded with Skiagraphy, as it is the name by which the test is universally known, and as it is the retina in its relative position to the refractive media, which we study.

120 S. EIGHTEENTH ST., PHILADELPHIA, PA.
March, 1897.

CONTENTS.

CHAPTER I.

PAGE

DEFINITION.—NAMES.—PRINCIPLE AND VALUE OF RETINOSCOPY.—SUGGESTIONS TO THE BEGINNER, ... 9–13

CHAPTER II.

RETINOSCOPE.—LIGHT.—LIGHT-SCREEN.—DARK ROOM.—SOURCE OF LIGHT AND POSITION OF MIRROR.—OBSERVER AND PATIENT, . . 14–19

CHAPTER III.

DISTANCE OF SURGEON FROM PATIENT.—ARRANGEMENT OF PATIENT, LIGHT, AND OBSERVER.—REFLECTION FROM MIRROR.—HOW TO USE THE MIRROR.—WHAT THE OBSERVER SEES.—RETINAL ILLUMINATION.—SHADOW.—WHERE AND WHAT TO LOOK FOR, . 20–26

CHAPTER IV.

POINT OF REVERSAL.—TO FIND THE POINT OF REVERSAL.—WHAT TO AVOID.—DIRECTION OF MOVEMENT OF RETINAL ILLUMINATION.—RATE OF MOVEMENT, SIZE, AND FORM.—RULES FOR LENSES.—MOVEMENT OF MIRROR AND APPARATUS, ... 27–37

CHAPTER V.

RETINOSCOPY IN EMMETROPIA AND THE VARIOUS FORMS OF REGULAR AMETROPIA.—AXONOMETER, ... 38–53

CHAPTER VI.

RETINOSCOPY IN THE VARIOUS FORMS OF IRREGULAR AMETROPIA.—RETINOSCOPY WITHOUT A CYCLOPLEGIC.—CONCAVE MIRROR.—DESCRIPTION OF THE AUTHOR'S SCHEMATIC EYE AND LIGHT-SCREEN, ... 54–63

INDEX, ... 65, 66

LIST OF ILLUSTRATIONS.

FIG.		PAGE
1.	Schematic Eye for Studying Retinoscopy,	12
2.	Retinoscope,	15
3.	Light-Screen or Cover Chimney,	16
4.	Arrangement of Patient, Light, and Observer,	21
5.	Folding Mirror,	22
6.	Folding Mirror with Illumination,	22
7.	Small Retinal Illumination to One Side by Tilting the Mirror,	25
8.	Small Retinal Illumination (Central),	25
9.	Retinal Illumination with Straight Edge,	33
10.	Retinal Illumination with Crescent Edge,	33
11.	Würdemann's Disc,	34
12.	Jenning's Skiascopic Disc,	35
13.	Hyperopia,	39
14.	Refracted Hyperopia,	40
15.	Emmetropia,	41
16.	Myopia,	43
17.	Refracted Myopia,	44
18.	Method of Writing a Formula,	47
19.	Band of Light in Astigmatism,	49
20.	Axonometer,	51
21.	Axonometer in Position,	52
22, 23.	Irregular Lenticular Astigmatism,	55
24.	Two Bands of Light. Scissor Movement,	56

RETINOSCOPY.

CHAPTER I.

DEFINITION.—NAMES.—PRINCIPLE AND VALUE OF RETINOSCOPY.—SUGGESTIONS TO THE BEGINNER.

Definition.—Retinoscopy may be defined as the method of estimating the refraction of an eye by reflecting into it rays of light from a plane or concave mirror, and observing the movement which the retinal illumination makes by rotating the mirror.

Names.—Dioptroscopy, fundus-reflex test,* keratoscopy, fantoscopy, pupilloscopy, retinophotoscopy, retinoskiascopy, skiascopy, umbrascopy, etc., are some of the other names given to this form of refraction, and their number and greater or less inappropriateness have had much to do, no doubt, with keeping retinoscopy in the background of ophthalmology instead of giving it the prominence which it more justly deserved and now receives.

The principle of retinoscopy is the finding of the point of reversal, and to do this, if the eye is not already sufficiently myopic, it may be necessary to place in front of the eye being examined such a lens

* Suggested by Oliver.

or series of lenses as will bring the emergent rays of light to a focus at a certain definite distance. (See Point of Reversal, chap. IV.)

Value of Retinoscopy.—Those who would criticize retinoscopy because "we see nothing and think nothing of the condition of the fundus," base their criticism apparently on the name, retinoscopy, rather than from any great amount of practical experience with the method. While admitting that the ophthalmoscope in front of a well-trained eye can often make a close refractive estimate, yet only to the few does such skill obtain, and even then there is that uncertainty which does not attach itself to the retinoscope in competent hands. The ophthalmologist who knows how to use the mirror accurately has the advantage of his confréres who are ignorant of the test; it gives him a position decidedly independent of his patient, and puts him above the common level of the traveling "Great Doctor Eye" and "refracting optician," who are tied to the trial-lenses and the patient's uncertain answers. Furthermore, when it is remembered that from 50 to 80 per cent. of the patients consulting the ophthalmologist do so for an error of refraction, it is well that he be most capable in this important part of the subject.

The wonderful advantage of retinoscopy over other methods needs no argument to uphold it; the rapidly increasing number of retinoscopists testify to its merits.

The writer, from the constant use of the mirror, would suggest the following axiom: That, *with an eye otherwise normal except for its refractive error,*

and being under the influence of a reliable cycloplegic, there is no more accurate objective method of obtaining its exact correction than by retinoscopy.

Retinoscopy gives the following advantages:

The character of the refraction is quickly diagnosed.

The exact refraction is obtained without questioning the patient.

Little time is required to make the test.

No expensive apparatus is necessarily required.

Its great value can never be estimated in nystagmus, young children, amblyopia, aphakia, illiterates, and the feeble-minded.

From what has just been written it must not be understood that the patient's glasses are ordered immediately, from the result obtained by retinoscopy; for, on the contrary, all retinoscopic work, like ophthalmometry, should be confirmed at the trial-case.

It is only in the feeble-minded, the young, and in cases of amblyopia that glasses are ordered direct from the result obtained in the dark room.

The subjective method of placing lenses before the patient's eyes and letting him decide by asking "is this better?" or "is this worse?" only too often fatigues the examiner and worries the patient, giving him or her a dread or fear of inaccuracy that does not satisfy the surgeon or tend to inspire the patient. But when the correct glasses are found by retinoscopy and placed before the patient's eyes and he reads $\frac{6}{6}$ or $\frac{20}{20}$ or more, it is easy to hold up a plus and minus quarter diopter glass respectively in front

of this correction, and let the patient tell at once if either glass improves or diminishes the vision.

The writer is not condemning the subjective or other methods of refraction, or trying to extol too highly the shadow-test, yet he would remind those

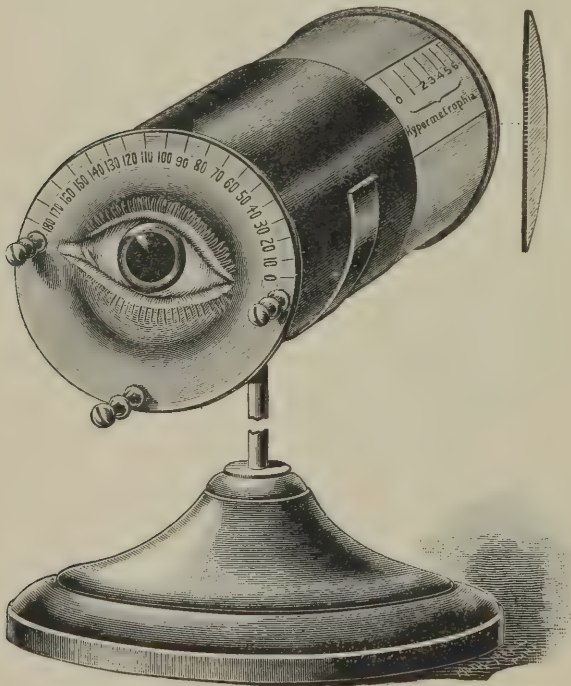

FIG. I.—THE AUTHOR'S SCHEMATIC EYE FOR STUDYING RETINOSCOPY.
(*For description, see chap. vi.*)

who try retinoscopy, fail, and then ridicule it, that the fault with them is back and not in front of the mirror.

Suggestions to the Beginner.—To obtain proficiency in retinoscopy there is much to be understood.

Careful attention to details must be given, and not a little patience possessed, as it is not a method that is acquired in a day, and it is only after weeks of constant application that accuracy is acquired. Therefore the beginner is strongly advised to learn the major points from one of the many schematic eyes in the market before attempting the human eye. At the same time he should be perfectly familiar with the laws of refraction and dioptrics, as an understanding of conjugate foci is really the underlying principle of the method; the retina being one focus and the myopic or artificially-made far point the other.

What is meant by major points applies more particularly to the study of the retinal illumination, its direction and apparent rate of movement, also its size and form, the distance between the observer and the patient, how to handle the mirror, etc., all of which are referred to under their special headings.

CHAPTER II.

RETINOSCOPE.—LIGHT.—LIGHT-SCREEN.—DARK ROOM. SOURCE OF LIGHT AND POSITION OF MIRROR.—OBSERVER, AND PATIENT.

The Retinoscope or Mirror.—Two forms of the plane mirror are in use—the one large, four centimeters in diameter with a four or five millimeter sight-hole often cut through the glass ; and the other small, two centimeters in diameter, on a four centimeter metal disc, with sight-hole two millimeters in diameter, *not* cut through the glass, the quicksilver or plating alone being removed. By thus leaving the glass at the sight-hole, additional reflecting surface is obtained at this point, which assists materially in exact work, as it diminishes the dark central shadow that shows so conspicuously when the sight-hole is cut through the glass. The small mirror has an advantage over the large by reducing the area of reflected light, as only a one centimeter area on each side of the sight-hole is of particular use. The small plane mirror* is the one recommended, and is made with either a straight or folding handle ; the latter is for the purpose of protecting the mirror when carried in the pocket. The purpose of the metal disc on which the small mirror is secured is to

---

* *Philadelphia Polyclinic*, November, 1893. Another form is described by Dr. E. Jackson, *American Journal of Ophthalmology*, April, 1896.

keep the light out of the observer's eye, and enable him to rest the instrument against the brow and side of the nose, but if its size should appear small, the observer can easily have a larger one made to suit his convenience. The plating or silvering on the mirror should be of the best, for on its quality depends, in part, the good reflecting power of the mirror, which is very important.

The central shadow just referred to as the result of the sight-hole had best be seen by the beginner,

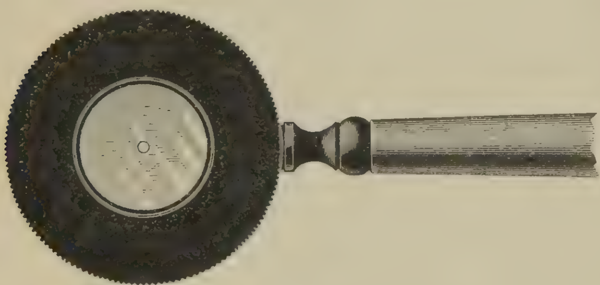

Fig. 2.—The Author's Retinoscope.*

by reflecting the light from the mirror on to a clear surface, before he begins any study, as this dark area may annoy him later if he does not understand its origin.

The Light.—This should be steady, clear, and white. The Welsbach possesses all these qualities, but unfortunately its delicate mantle will not stand much jarring, and is easily broken in consequence, causing much loss of time and annoyance. The

---

* See foot-note on preceding page.

electric light with a twisted carbon and ground-glass covering with a round center of clear glass, is growing quite popular. For constant service, however, the Argand burner is decidedly the best, when the asbestos light-screen is used to intercept the heat. Whatever light is employed, it is well to have it on an extension bracket, so that the observer may move it to or from the patient, as necessary.

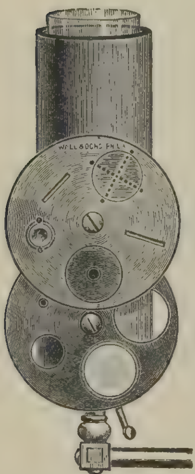

FIG. 3.—THE AUTHOR'S LIGHT-SCREEN OR COVER CHIMNEY.
(*For a further description, see chap. vi.*)

The light-screen or cover chimney is made of one-eighth inch asbestos, and of sufficient size (six centimeters in diameter by twenty-one in height) to fit over the glass chimney of the Argand burner.

Attached to the screen are two superimposed revolving discs that furnish four round openings, respectively five, ten, twenty, and thirty millimeters, any one of which may be turned into place as occasion may require. Care should be taken that the opening used is placed opposite to the brightest part of the flame. Formerly these screens were made of sheet-iron, but the asbestos has been found preferable, as it does not radiate the heat to the same extent as the iron. The purpose of the light-screen is to cover all of the flame except the portion which presents at the opening in the disc.

The room must be darkened—and the darker the

better—all sources of light to be excluded except the one in use. It must not be supposed from this that the room must have its walls and ceiling blackened; on the contrary, if the shades are drawn the room will be sufficiently dark, though of course a perfectly black room would be best, as giving a greater contrast to the condition to be studied. The exclusion of other lights, or beams of light, must be insisted upon, as the principal use of the darkened room is to keep all light out of the eye to be examined except the light in use.

As the method of using the concave mirror with source of light (20 or 30 mm. opening in screen) beyond its principal focus (usually over and beyond the patient's head) has been superseded by the simpler and easier method of using the small plane mirror with source of light (one-half or one cm. opening in light-screen), brought as close to the mirror as possible, the description of retinoscopy which follows will refer to the latter.

The Source of Light and Position of the Mirror.—The rays of light coming out of the round opening in the light-screen should be five or six inches to the left of the observer, so that they may pass *in front* of the left eye and fall upon the mirror held before the right, thus leaving the observer's left eye in comparative darkness; or the observer may use the mirror before the left eye in case he is left-handed and has the light to his right. It is always best for the observer to keep both eyes wide open and to avoid having any light fall into the unused eye, which would cause him much annoyance. Some ob-

servers hold the mirror before the eye next to the screen, but this is not recommended for the reasons just mentioned.

The observer must necessarily wear his correcting glasses, but need not make any note of his accommodation, as in using the ophthalmoscope. He should take his seat facing the patient and, as the strength of the reflected light rapidly weakens as the distance between the mirror and the light-screen is increased, he should have the light-screen close to his face (not less than six inches) if he wishes to get the fullest possible strength of light on the mirror; and when working to find the point of reversal, more exact work will be accomplished if this distance between light and mirror is very short. The further the light from the mirror, the less brilliant its reflection and the larger or more prominent the central shadow of the sight-hole in the mirror—*two very serious objections.*

The patient must have his accommodation thoroughly relaxed with a reliable cycloplegic, and should be seated comfortably, one meter distant, in front of the observer, with his vision steadily fixed on the observer's forehead, just above the mirror. Or, what is even better, the patient may concentrate his vision on the edge of the metal disc of the mirror, but never directly into the mirror, as that would soon irritate and compel him to close his eye.

In this way the patient avoids the strain of looking into the bright reflected light, and at the same time the macular region is refracted. It is customary to cover the patient's *other* eye while its fellow

is being refracted; for obvious reasons this is specially important in cases of "squint." To get the patient's eye and the observer's forehead just one meter apart, the distance may be marked off on the wall of the dark room on the side where the light is secured, or a meter stick for the purpose may be held in the hand of the observer or his assistant.

CHAPTER III.

DISTANCE OF SURGEON FROM PATIENT.—ARRANGEMENT OF PATIENT, LIGHT, AND OBSERVER.—REFLECTION FROM MIRROR.—HOW TO USE THE MIRROR.—WHAT THE OBSERVER SEES.—RETINAL ILLUMINATION.—SHADOW.—WHERE AND WHAT TO LOOK FOR.

Distance of Surgeon from Patient.—There is no fixed rule for this, and each surgeon may select his own distance. It might be well for the beginner to try different distances and then choose for himself. The writer prefers a one meter distance, and with few exceptions adheres to it. Some prefer six meters, others two meters, etc. The distance of one meter has two important advantages: There is no getting up or down to place lenses in front of the patient's eye, as the patient or surgeon, or both, may lean forward for this purpose, if necessary. Another advantage is that at one meter distance there is a uniform allowance of one diopter in the estimate, which will be explained more fully under Rules for Retinoscopy at One Meter.

Arrangement of Patient, Light, and Observer.—This has already been described in great part, but reference to the accompanying sketch may give the student a more exact appreciation of the arrangement than any lengthy description could do.

For convenience of the beginner in using the mirror, it is best, as here shown, to keep the surgeon's

eye, the light, and the patient's eye on a horizontal line. The beginner will find it sufficiently difficult at first to keep the light on the patient's eye with the mirror held perpendicularly, without inclining it up or down, as he would have to do if the arrangement suggested is not carried out.

Reflection from the Mirror.—The rays of light coming from the round opening in the screen to

FIG. 4.—ARRANGEMENT OF PATIENT, LIGHT, AND OBSERVER.

the plane mirror are reflected divergently, as if they came from the opening in the screen situated just as far back in the mirror as they originally started from in front (see Figs. 13, 15, and 16), and the patient looking into the mirror sees a round, bright red spot, just as large as the opening in the screen.

The nearer the light and mirror are brought together the brighter will be the reflected rays, and

the more nearly will the observer's eye and source of light correspond.

How to Use the Mirror.—It should be held firmly before the right eye so that the sight-hole is opposite to the observer's pupil; and that it may be steady, the second phalanx of the thumb should rest

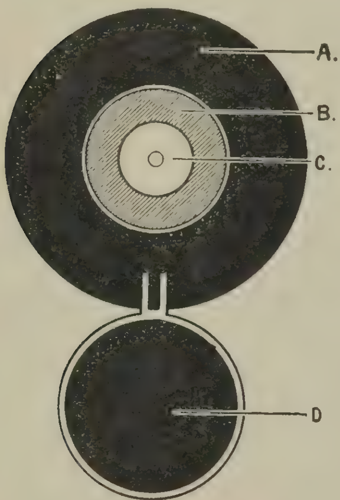

FIG. 5.

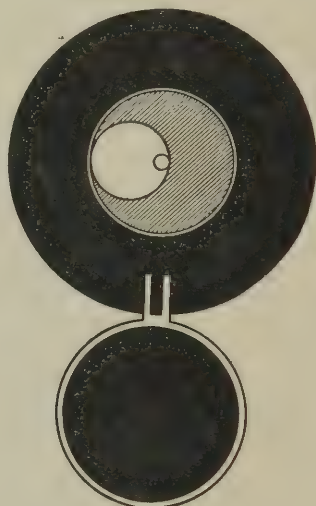

FIG. 6.

AUTHOR'S MIRROR WITH FOLDING HANDLE.

FIG. 5.—Showing central light C, on small mirror B. This is the light the patient sees when looking into the mirror, and corresponds in size to the one centimeter opening in screen. D is the folding cap handle to protect B when not in use. A is the metal disc.

FIG. 6.—Shows the light moved to one side or as a result of tilting the mirror.

on the cheek just below the eye, the edge of the metal disc even touching the side of the nose if the observer's interpupillary distance is not too great. Thus held in position, its movements should be very limited, though they may be slow or quick, but *never*

at any time should it be tilted more than two or three millimeters; for if inclined *more* than this, the light is lost from the patient's eye. If the light, the patient's, and the observer's eyes are on a horizontal line, then to find the patient's eye with the reflected light all the observer has to do is to reflect the light back into the light-screen, and by rotating the mirror to his right, carry the reflected light around on the same line until the patient's eye is reached. This may seem like a superabundance of instruction, but the finding of the patient's eye, which appears so easy, is an immense stumbling-block, at the beginning, to most students. Another way to find the eye is for the observer to hold his left hand up between his and the patient's eye and reflect the light on to it, and when this is done to drop his hand and let the light pass into the observed eye. Having succeeded in finding the patient's eye, the observer, if he is not very careful in his limited movements of the mirror and himself, will turn the light from the eye almost before he knows it, and so be compelled to start and find it again; this causes much loss of time. A little practice on the schematic eye will assist the beginner wonderfully, and give him courage, for if he hastens to the human eye, and then has to stop every minute or so to try and get the light on the eye, he soon becomes discouraged and shows his want of experience to the patient.

What the observer sees; or the general appearance of the reflection from the eye.—With the mirror held still before his eye, and close up to the bright light coming from the five or ten millimeter

opening in the light-screen, the observer will obtain a reflection from the patient's eye, which varies in different patients, and is subject to certain changes in the same patient as the refraction is altered by correcting lenses, or it may be changed by the turning of the patient's head, or lengthening the distance between the mirror and the light, or increasing or diminishing the strength of the light, or increasing the distance between the observer and the patient. The reflection from the eye of the albino or blond is much brighter than from the brunette or mulatto, in whom it is not so bright, even dim. This character of the reflex is controlled, of course, in great part, by the amount of pigment in the eye ground; however, in most instances there is more or less of an orange-red color to the reflex. Cases of high errors of refraction give a dull reflection as compared to low errors, where the reflection is usually *very* bright. Should the media be irregular or not perfectly clear the reflection is altered accordingly; this will be referred to under the head of Irregular Astigmatism. The observer will also notice on the cornea and lens pin-point catoptric images, and at the inner edge of the iris, in most eyes, a very bright ring of light about one millimeter in width, which is due to the very strong peripheral refraction; and as the eye is being refracted and the point of reversal approached, this peripheral ring may develop into a broader ring of aberration rays, which at times will be annoying. This will be referred to under Spheric Aberration, chapter VI.

Retinal Illumination.—By holding a strong con-

vex lens closer to or further from a plane surface than its principal focus, and letting the sun's rays pass through it, there will be seen on the plane surface a round area of light; it is this light area which corresponds to the illumination on the retina, seen in retinoscopy by reflecting the light from the mirror into the patient's eye, and hence it is spoken of as the retinal illumination.

Of course the size and form of this illumination is controlled, in great part, by the refraction of the patient's eye.

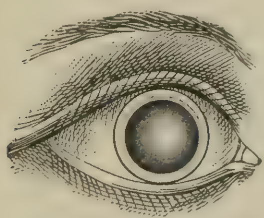

FIG. 7.—SMALL RETINAL ILLUMINATION TO ONE SIDE, BY TILTING THE MIRROR.

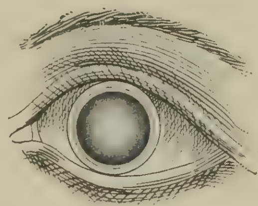

FIG. 8.—SMALL RETINAL ILLUMINATION (CENTRAL).

Shadow.—This is the nonilluminated portion of the retina immediately surrounding the illumination. The illumination and shadow are therefore in contact, and the contrast is most marked and easily recognized when the illumination is brightest. It is by this combination of the illumination and non-illumination (shadow) that we study and give the "shadow test" its name. In the dark room, the patient keeping his eye fixed, the retina is stationary and in total darkness, except the portion illuminated by the light from the mirror. (See Fig. 8.) If the

mirror be rotated, the retinal illumination changes its place (see Fig. 7) and darkness (or shadow) appears in its stead. It is by this change of illumination and shadow (darkness) that we often speak of a movement of the shadow.

Where and What to Look For.—With the patient, the observer, and the source of light in position as directed, the rays of light are reflected into the eye from the mirror as it is gently rotated in the various meridians, and the (1) *form*, (2) *size*, (3) *direction, and* (4) *rate of movement* of the retinal illumination are carefully noted through a four or five, or even six, millimeter area *at the apex of the cornea*, as *this* is the part of the refractive media in the normal eye that the patient will use *when* the effects of the cycloplegic pass away and the pupil regains its normal size.

The one or two millimeter area at the edge of the pupil should be avoided by the beginner, except in special instances, as only too frequently it contains a bright ring of light which may or may not give a stronger refraction than the area at the apex of the cornea. See Spheric Aberration, chapter VI.

CHAPTER IV.

POINT OF REVERSAL.—TO FIND THE POINT OF REVERSAL.—WHAT TO AVOID.—DIRECTION OF MOVEMENT OF RETINAL ILLUMINATION.—RATE OF MOVEMENT, SIZE, AND FORM.—RULES FOR LENSES.—MOVEMENT OF MIRROR AND APPARATUS.

Point of Reversal.—This may be stated in several ways. It is the myopic far point (punctum remotum) or artificial focal point of the emergent rays of light, figure 14, or the point where the emergent rays cease to converge and commence to diverge, or the point conjugate to the retina, figure 17, or where the erect image ends and the inverted image begins.

To Find the Point of Reversal.—The recognition of the point of reversal is the principle of retinoscopy. It is what is sought for, and, when obtained under certain definite arrangements, is the correct solution of the test. During the test it is easy to tell when the shadow moves with or against the light on the face, but to get the exact point where there is no apparent movement is not always easy, and is only acquired after careful practice.

For example, having determined at one meter that the retinal illumination with a + 1.50 D just moves with the light on the face, and against with a + 1.75 D, we know that the reversal point must be between the strength of the two lenses, or + 1.62 D. This demonstrates how we arrive at the exact correction, and also the capability and accuracy of retinoscopy.

The method of obtaining the point of reversal much closer than one meter requires such an exactness in measuring and calculating that it does not meet with the general favor and satisfaction accorded to that found by producing an artificial myopia of one diopter or less, for the reason that at points closer than one meter, if an error of one or two inches has been made in defining the focus of the emergent rays a decided mistake will be the result. The point of reversal or focus of emergent rays is always negative in hyperopic and emmetropic eyes. In myopic eyes, however, the emergent rays always focus at some point inside of infinity, and the observer may, therefore, if he is so disposed, by moving his light and mirror to or from the patient's eye, as the case may be, find a point where the retinal illumination ceases to move. If this should be at two meters the patient would have a myopia of 0.50 D; if at four meters, a myopia of 0.25 D; if at one meter, a myopia of one diopter, etc.

It is well for the beginner to remember, when using the plane mirror, that the illumination *on the patient's face always moves in the same direction the mirror is tilted*, but *not* necessarily so in the pupillary area, where it may move opposite; and *here* it is that we speak of the retinal illumination moving with or against (opposite to) the movement of the mirror, as the case may be, and make our diagnosis accordingly.

As the rays of light from the mirror proceed divergently to the patient's eye, as if they came from a point back in the mirror equal to the distance of the

light (opening in light-screen) in front of it and working at one meter's distance, with source of light five inches in front of the mirror, the rays appear to emerge from a point five inches back of the mirror, or a total distance of 45 inches from the patient's eye, thus giving the rays of light a divergence equal to 0.87 of a diopter before they reach the patient's eye, and this point may be made conjugate to the retina. The observer will do good work if he reduces the retinal illumination to the utmost limit where it can be faintly seen moving with the movement of the mirror, and *if* this is done the observer's eye and mirror will be just inside of the point of reversal, where the erect image can still be recognized.

At the point of reversal no definite image is made out and the pupillary area is seen to be brilliantly illuminated.

If the observer's eye is, at this point, exactly conjugate to the retina, then the movement of the reflected light on the retina cannot be perceived (though it does move), and the retinal illumination will occupy the entire pupil and the shadow will be absent.

Instead, however, of reducing the retinal illumination to the utmost limit (as just mentioned), where it can be faintly seen moving with the movement of the mirror, the writer prefers and recommends placing before the eye under examination such a lens or series of lenses as will bring the emergent rays of light to a focus on his own retina, so that no movement of the retinal illumination can be recognized.

When the point of reversal is approached, the uni-

form color of the retinal illumination occupies so much of the pupillary area that the student may think he has reached the point of reversal, and if he is not careful to pass the retinal illumination slowly across the pupil and get the shadow, he will find his result deficient, and possibly miss seeing some small amount of astigmatism.

To make sure about the point of reversal, it is always best, especially for the beginner, to keep putting on stronger neutralizing lenses until he gets a *reversal* of movement, when he knows at once that he has passed the point of focus of the emergent rays.

The lenses which control the rays of light emerging from the patient's eye are spoken of as neutralizing lenses.

What to Avoid.—It occasionally happens that a retinal vessel or vessels, or even the nerve head, may be seen when the light is reflected into the eye; if so, they are to be ignored, as they are not parts of the test. If the patient's eye is turned, or the rays from the mirror fall obliquely, or the neutralizing lens in front of the eye is inclined instead of being perpendicular, there will be seen reflections of light and images upon the neutralizing lens or cornea, or both, and, in consequence, the retinal illumination is more or less hidden or obscured; these images and reflections can be easily corrected by removing the cause. The catoptric images cannot be removed, but, as they are very small, the beginner soon learns to ignore them. The retinal illumination may contain a small dark center, which will disturb the beginner unless he remembers that it is

caused by the sight-hole in the mirror, and that it shows particularly when the sight-hole is large and cut through the mirror. This same dark center in the illumination is also seen at times when the light is removed some distance from the mirror, and the correcting lens almost neutralizes the refraction. The neutralizing lens should never be so close to the eye that the lashes touch, and, in warm weather especially, moisture from the patient's face may condense on the trial-lens, and temporarily, until it is removed, obscure the reflex.

Retinoscopy with a Plane Mirror at One Meter's Distance and Source of Light close to the Mirror.—Direction of Movement of Retinal Illumination.—Rate of Movement.—Size and Form.—These important points in reference to the retinal illumination should be decided promptly and without any prolonged examination. This proficiency, of course, will only come by practice, and if, on first examination, the observer cannot decide whether the retinal illumination is with or opposite to the movement of the reflected light on the face, he may approach the eye until this point is determined. The four important essentials may be stated in the following order and in the form of rules:

Direction.—The movement of the retinal illumination, when rotating the mirror, going *with* the movement of the light on the patient's face, signifies emmetropia, hyperopia, or myopia, if the myopia be *less* than one diopter.

The apparent movement of the retinal illumination going *opposite* to the movement of the light on

the face always signifies myopia of *more* than one diopter.

Rate.—The larger the retinal illumination the more slowly it appears to move, and generally, not always, requires a strong lens for its correction.

The smaller the retinal illumination the faster it appears to move, and generally, not always, requires a weak lens for its correction. What has al ready been said in regard to the **rate** of movement also applies to the **size** of the illumination.

Form.—If the retinal illumination is a band of light extending across the pupil it signifies astigmatism.

The width of the band of light does not indicate so much the strength of the correcting cylinder required as does the apparent rate of movement; if slow, a strong, if fast, a weak, cylinder is required.

A large round illumination, while it may signify hyperopia or myopia, does not preclude astigmatism in combination.

When the illumination appears to move *faster* in one meridian than the meridian at right angles to it, astigmatism will be in the meridian of *slow* movement.

The band of light that is seen when a spheric lens corrects one meridian, and the meridian at right angles remains partly corrected, indicates the axis of the cylinder in the prescription.

Rules for Placing Neutralizing Lenses.—A *plus* lens is required when the retinal illumination moves *with* the illumination on the face, and a *minus*

lens is required when it moves *opposite* to the light on the face.

Movement of the Mirror.—There are times when a quick movement, and, at other times, a slow or gradual movement is required. A substitution of the former for the latter, and the result cannot always be correct.

A quick movement may be used when looking into the eye before any correcting lens has been placed *in situ*. It often tells the character of the refraction.

The slow movement comes into use and is of the *utmost* importance when the eye has been

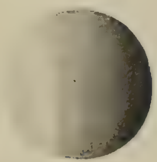

FIG. 9.—STRAIGHT EDGE, INDICATING ASTIGMATISM.

FIG. 10.—CRESCENT EDGE, INDICATING SPHERIC CORRECTION.

corrected to within 0.75 D or less, as it is generally at this point that so many, by a *quick* movement, hasten the peripheral rays and mask the central illumination, giving the idea at once of over-correction. This is a most common error with the beginner, the inexperienced, and with those who fail to get good results and who ridicule retinoscopy as "not exact," or as "not agreeing with the subjective method." It is well in *every* instance, when the point of reversal is approached, to pass the retinal illumination (not the light area on the face) well across the

pupil to make *sure* in regard to the character of shadow which follows or precedes it. This movement, at such a point in neutralization, may give a hint as to the presence of astigmatism or not, as a reference to drawings, figures 9 and 10, will show. The presence of astigmatism is known by the straight edge of the illumination, or, in its place, a crescent edge would mean a spheric correction.

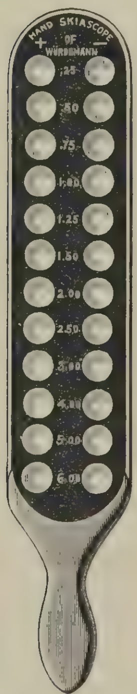

FIG. 11.—WÜRDEMANN'S DISC.

Apparatus for placing lenses in front of the patient's eye.—There are several different forms in the market, their purpose being twofold—to save time and any extra movements on the part of the surgeon. Of these, that of Würdemann (*American Journal of Ophthalmology*, p. 223, 1891) seems the best hand skiascope. A reference to the sketch shows this instrument with its convenient handle, whereby the patient, being instructed, raises or lowers the disc in front of the eye, with its smooth, broad edge resting against the side of his nose.

One column contains plus and the other minus lenses, and as it is reversible, these may be placed in front of the eye as the surgeon directs.

The most modern and complete revolving skiascopic disc is that of Jennings (*American Journal of Ophthalmology*, November, 1896), and may be best understood from his own description: "It consists

of 39 lenses inclosed in an endless groove and propelled by a strong driving-wheel situated at the lower end of the frame. A small rod runs the length of the table, and is connected at one end with the driving-wheel and at the other with a small wheel within easy reach of the operator's hand. At the surgeon's

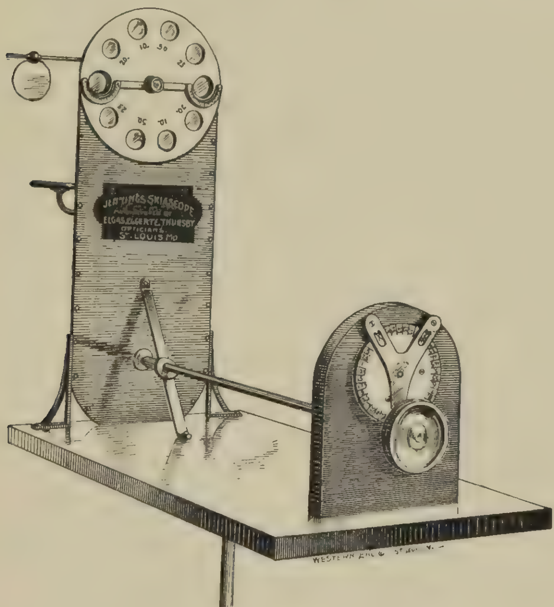

FIG. 12.—JENNING'S SKIASCOPIC DISC.

end of the table, and facing him, is a disc on which, at a certain aperture,—marked L or R, according to which eye is under examination,—is indicated the lens presented at the light-hole. The red numbers represent convex, and the white concave, lenses. The lenses range from 0.25 to 9 D plus and from 0.25 to 10 D minus. In addition to the lenses just

mentioned are eight others, 0.25, 0.50, 10 and 20 D plus and minus, set in a separate disc, any one of which can be put in front of the sight-hole without rotating the whole series of convex or concave lenses. By means of this extra disc we can make combinations from 0.25 to 29 D plus, and from 0.25 to 30 D minus. In front of each sight-hole is placed a cell, marked in degrees, to hold cylinders (not shown in drawing). Attached to the back of the upright frame, by means of a hinge, is a chin-rest and a movable blinder, both of which swing to the right or left as may be desired. The whole is mounted on a strong stand, which can be raised or lowered to suit the requirements of each patient. The essential advantages of this skiascope are as follows:

"(1) It saves time and fatigue in changing lenses.

"(2) It is under the control of the operator, and indicates the lens in front of the sight-hole without his getting up.

"(3) The mechanism is simple and durable.

"(4) There are no shafts, uprights, or indicators to obstruct the view of the operator.

"(5) It is only under exceptional circumstances that it is necessary to use the disc containing the extra lenses.

"(6) There is only one indicator and one wheel to turn."

While either the hand or revolving disc are recommended, yet the writer is partial to an accurately fitting trial-frame, using the lenses from the trial-case, which should be conveniently at hand. The

following suggestions in the selection and use of the trial-frame are offered: The temples should rest easily on the ears, the nose-piece (bridge) to have a sufficiently long post to permit the eye-pieces to fit high and accurately over any pair of eyes, especially those of children, and have the corneæ occupy the center of each eye-piece. Correct results cannot be expected or quickly obtained unless the neutralizing lenses be placed with their centers corresponding to corneal centers, and at the same time perpendicular to the front of the eye.

CHAPTER V.

RETINOSCOPY IN EMMETROPIA AND THE VARIOUS FORMS OF REGULAR AMETROPIA.—AXONOMETER.

Hyperopia.—By rotating the mirror in the various meridians and making a note of the direction and rate of movement of the retinal illumination, which in this form of refraction is *with* the movement of the light on the patient's forehead, a strong or weak plus sphere, according to the apparent *rate* of movement, is placed before the eye, and the size and rate of movement of the retinal illumination are again noted; practice alone will guide the observer in a quick appreciation of the approximate strength of neutralizing lens to thus employ.

If the movement is rather slow and the observer has placed a + 2.75 D before the eye (here the five mm. opening in the light-screen may be used to advantage), and the illumination is diminished in size and very faint, appearing to move fast and with the light on the face, the hyperopia is still slightly uncorrected, and a stronger lens must be substituted. Removing the + 2.75 D, and placing a + 3.25 D in its place, if the retinal illumination is found to move *opposite* to the movement of the light on the face, the refraction of the eye will then be between the + 2.75 D and the 3.25 D, which is 3 D. (See example, p. 27, chap. IV.) Now, while the + 3 D has brought the emergent rays to a focus at one

meter, it has made the eye myopic just one diopter, so that in taking the patient from the dark room to test his vision at six meters, or infinity, this one diopter (artificial myopia) must be subtracted from the + 3 D, which would leave + 2 D the amount of the hyperopia.

A reference to figures 13 and 14 will illustrate the description just given.

Figure 13 is the hyperopic eye with round central illumination and surrounding shadow. The profile view shows the mirror at one meter distance and light five inches from the mirror. The dotted lines represent the rays proceeding divergently from the eye under examination, the dark lines show the reflected rays from the mirror, which illuminate the retina and have an imaginary focus (dotted lines) beyond the retina.

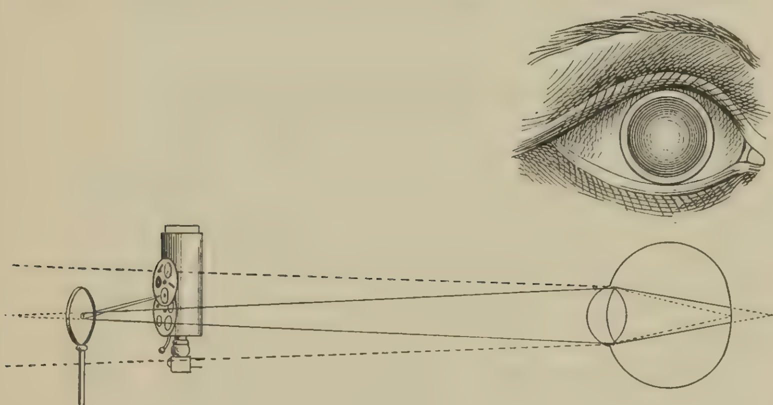

FIG. 13.

Figure 14 is a profile view showing the hyperopic eye with neutralizing lens in position. The dotted

lines with arrow-heads indicate the direction the rays would naturally take coming from the eye. The lens (+ 3 D) in front of the eye is just sufficiently strong to bend these divergent rays and bring them to a focus at one meter's distance (artificial point of reversal). In other words, + 2 D of the three diopters thus placed before this hyperopic eye would have bent the divergent rays and made them parallel, or emmetropic, but the additional one diopter bends the rays still more and brings them to a focus (P. R.) at one meter. If now the ob-

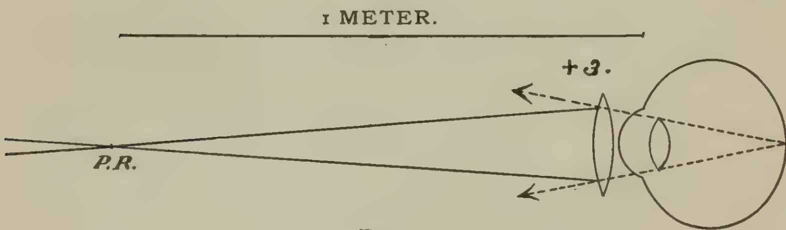

FIG. 14.

server approaches the eye thus refracted and observes the retinal illumination closer than one meter, he will be inside of the point of reversal, and consequently see an erect image moving with the direction of the movement of the mirror. If beyond this point of reversal, he would get an inverted image and the retinal illumination moving opposite to the movement of the mirror.

Emmetropia.—The emergent rays from an emmetropic eye are always parallel, and the rays of light from the mirror going into such an eye do not focus upon the retina, but form a small,

bright, central illumination, which moves *rapidly* with the light on the face as the mirror is slowly rotated.

A reference to figure 15 shows the emmetropic eye under examination with its retinal illumination smaller than in the hyperopic eye of two diopters just described. The profile view shows the position of light, mirror, and eye, as in figures 13 and 14. The dotted lines are the parallel emergent rays, and

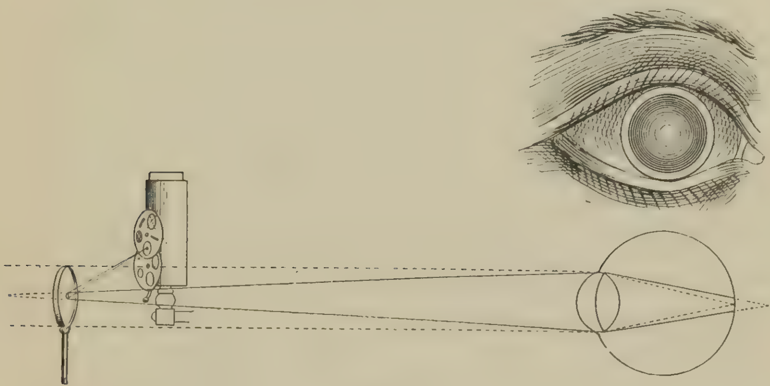

FIG. 15.

the solid lines the divergent rays from the mirror and an imaginary focus just beyond the retina. The purpose in this instance, as in all others of retinoscopy, is to place such a neutralizing lens before the eye as will bend the emergent rays and bring them to a focus at a certain definite distance, making the emergent rays from a point on the retina come to a focus on the observer's retina. Therefore, to reduce this small, bright, retinal illumination so that no movement can be seen in the pupillary area, and

at the same time have the emergent rays focus on the observer's retina, a + 1 sphere must be placed before the eye.

Myopia.—In myopia the emergent rays *always* converge to the far point (point of reversal), and the observer, seated at one meter from the eye, will have the apparent movement of the retinal illumination going opposite to the light on the face *if* the myopia exceeds one diopter, and *with* the light on the face *if* the myopia is less than one diopter. If the myopia should be *just* one diopter, then the emergent rays would focus on the observer's retina at one meter, and there will not be any neutralizing lens required to accomplish this purpose; but if the emergent rays focus beyond one meter, the observer will be within this point of reversal or focus, and will, therefore, have an erect image, small, and moving fast with the movement of the mirror, and will have to place before the eye a plus lens of less than one diopter to bring the point of reversal up to one meter. When the myopia is more than one diopter, and observer at one meter, the emergent rays will have focused somewhere between the observer and patient, and, as a result, the retinal illumination appears to move opposite to the light upon the face, more or less rapidly, according to the amount of myopia; and a concave or minus lens must be placed in front of such an eye that will bring the emergent rays to a focus at one meter, or, in other words, will stop all apparent movement of the retinal illumination. If, for example, a —2.75 D has been so placed, and the movement is still slightly opposite to the movement

of the mirror, and a —3.25 D substituted makes the retinal illumination move *with* the movement of the mirror, then the neutralizing lens for one meter would be the difference between —2.75 D and —3.25 D, which will be —3 D.

Figure 16 shows the myopic eye just described, with its large retinal illumination, which would move opposite to the movement of the light on the patient's face. The profile view shows the position of the

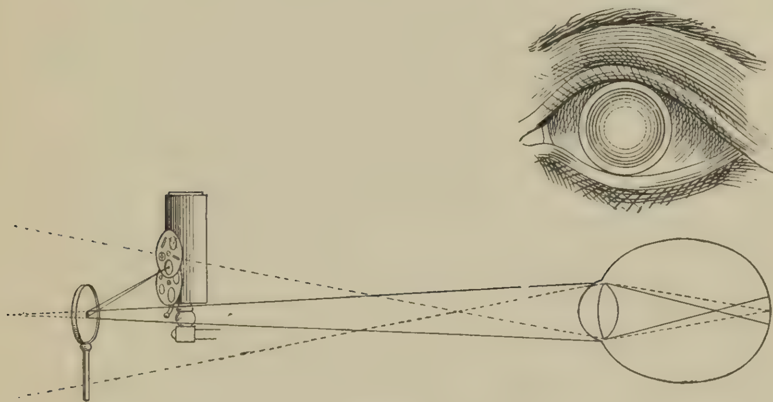

FIG. 16.

mirror, light, and eye, as in figures 13, 14, and 15. The solid lines represent the rays reflected divergently from the mirror focusing at a point in the vitreous before coming to the retina, and the broken lines show the rays emerging from a point on the retina and then converging to the focus, far point, or point of reversal close to the eye, between the eye and the mirror. The observer, seated at the mirror one meter distant, gets an opposite movement in the pupillary

area from the direction in which he moves his mirror, and, of course, an inverted image. If the observer had his eye at the point where the emergent rays focused (dotted lines cross), he would not recognize any movement in the pupillary area, and it would have a uniform reflex. The amount of the myopia is equal to the distance measured from this point of reversal to the cornea ; for example, if the distance (point of reversal) was 25 cm. from the patient's eye, then the amount of the myopia would be four diopters.

Figure 17 is a profile view of the myopic eye. The

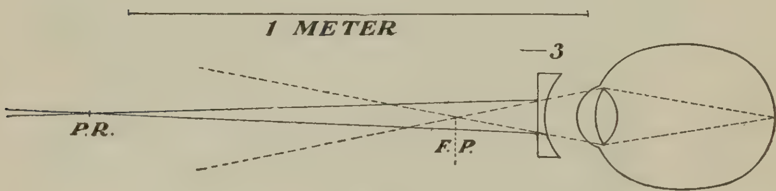

FIG. 17.

dotted lines show the rays coming from a point on the retina and focusing at the far point ; the solid lines show the emergent rays acted upon or bent by a plano-concave lens of three diopters, which has lessened the convergence of these emergent rays and put the far point further from the eye, or at a distance of one meter. The observer at this distance does not appreciate any movement in the pupillary area, but if he moves the light and mirror closer to the eye he is then inside the point of reversal and gets an erect image moving with the movement of the mirror; if beyond the one meter distance, an in-

verted image and movement against the movement of the mirror will be seen. If a —4 D lens had been placed before this myopic eye, the emergent rays would have proceeded from it, parallel or emmetropic, and the observer, at one meter, would have the same conditions as in the refraction of an emmetropic eye, figure 15; but as only a —3 D glass was used, the eye has one diopter of its myopia uncorrected. From the description of retinoscopy in hyperopia, emmetropia, and myopia, just given, the student will recognize at once that the hyperopic, emmetropic, and myopic eye of less than one diopter, working with the plane mirror at one meter's distance, are given a stronger refraction than they naturally call for, or, in other words, are made, artifically, myopic 1 D. And the myopic eye of more than one diopter, under similar conditions, being already myopic, retains one diopter of its myopia. To give a patient thus refracted with the retinoscope his emmetropic correction (correction for parallel rays of light), *an allowance must always be made, in all meridians, of one diopter, no matter what the refraction*. The artificial myopia thus produced gives the following rules for glasses required for infinity:

Rules.—1. When the neutralizing lens employed is plus, then subtract one diopter.

2. When the neutralizing lens employed is minus, then add a —1 D, or what is more simple, or even a better rule, is: To *always add a —1 sphere to the neutralizing lens obtained in the dark room when working at one meter, and the result will be the emmetropic or infinity correction.*

Examples:

Dark Room, ...	+0.50	0.00	+1.00	+2.00	—1.00
Adding, ...	—1 00	—1.00	—1.00	—1.00	—1.00
Emmetropic Correction,	—0.50	—1.00	—0.00	+1.00	—2.00

The main point in all retinoscopic work to remember in changing from the dark room to the six meter correction, is to always allow for the distance from the patient's eye to the point of reversal; i. e., if working at half a meter, allow two diopters; if at two meters, 0.50 D; if at four meters, 0.25 D, etc.

Regular Astigmatism.—When refracting with the retinoscope, the observer should remember *that he is refracting the meridian in the direction of which he moves the mirror.* Particular attention is called to this important fact on account of the confusion sometimes arising in the student's mind from the use of the ophthalmoscope, where the refractive condition of a certain meridian is studied by the appearance of the vessels at right angles to it. Astigmatism being present in an eye, means a difference in the strength of the glass required for the two principal meridians which, with few exceptions, are at right angles to each other, and it is to these two principal meridians *only* that the observer pays attention; for example, the eye that takes the following formula,

$$+ 1.00 \text{ D} \bigcirc + 1.00 \text{ c. axis } 105^\circ,$$

means that on the 105 meridian there is + 1 D and on the 15 meridian a + 2 D. In the dark room a + 2 sphere on such an eye at one meter would correct the 105 meridian and partly correct the 15 mer-

idian; or a + 3 D would correct the 15 and over-correct (movement against) the 105 meridian. When with + 2 D the 105 meridian is corrected and the 15 only partly so, there is seen in the 15 meridian a band of light which stands or extends across the pupil on the 105 meridian and moves across the pupil from left to right *with* the movement of the mirror as it is tilted in the 15 meridian.

The presence of this band of light *after* the meridian of least ametropia has been corrected *always* signifies astigmatism, and the axis it subtends—in

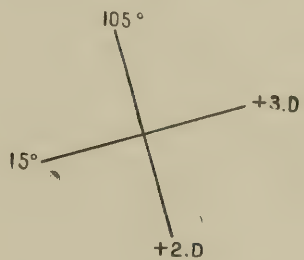

FIG. 18.

this case 105°—gives the axis of the cylinder in the prescription; and the amount of the astigmatism, or the strength of the cylinder required, is the difference between the strength of the two spheres employed. Figure 18 shows the method of writing such a dark room correction, and adding, according to our rule, a —1 to this dark room work, we get our original formula:

$$+ 1.00 \text{ D} \bigcirc + 1.00 \text{ c. axis } 105^\circ.$$

The method of correcting with spheres will be found much more satisfactory than by placing a + 2 D,

as called for in the 105 meridian, then adding and changing cylinders until the correct one is found. It takes much time and care to get the cylinder axis just right, and is most difficult in the dark room. After the result has been obtained with spheres, the observer may, if he is so disposed, prove it with the sphero-cylinder combination.

Astigmatism may or may not be recognized on first inspection of the fundus-reflex, this depending *entirely* on the refraction; if it be a high astigmatism with a small amount of refractive error in the opposite meridian, as in one of the following formulas,

$$+ 1.00 \text{ D} \bigcirc + 3.00 \text{ c. axis } 75°,$$
$$- 1.00 \text{ D} \bigcirc - 4.00 \text{ c. axis } 180°,$$

then the band of light so characteristic of astigmatism will be plainly seen on first inspection, extending across the pupil before any neutralizing lens has been placed in position; but if the hyperopia or myopia be high and the cylinder required is low, as in one of the following formulas,

$$+ 3.00 \text{ D} \bigcirc + 0.75 \text{ c. axis } 105°,$$
$$- 4.00 \text{ D} \bigcirc - 1.00 \text{ c. axis } 165°,$$

then the band of light is not recognized on first inspection or until an approximate correction has been placed before the eye. To get an idea of what the band of light looks like, the beginner may refer to figures 19 and 21; or focus rays of light through a strong cylinder; or, better still, place a cylinder in front of the schematic eye and study the retinal illumination. The student should bear in

mind that the axis of the band of light appears on the meridian of least ametropia, and is brightest when this meridian has received its full spheric correction —the opposite meridian being only partly corrected. The reason for the brightness of the band of light when the meridian of its axis is corrected is that any point on the retina in this meridian is conjugate to the focus on the observer's retina (point of reversal), and any movement of the mirror in this meridian is not recognized, but has a uniform color and occupies the entire meridian of the pupil. To recognize so small an error as a quarter diopter cylinder, —which is *not* easily detected, and the observer, if he is in a hurry, might think the case one of simple hyperopia or myopia,—the writer would suggest that when the supposed point of reversal is reached the correcting sphere be increased a quarter of a diopter, and *if* only one meridian is found over-corrected, the other remaining correct, he *then* knows that a quarter cylinder is required; for example, a + 2 D is supposed to correct all meridians, and yet by substituting a + 2.25 D the vertical meridian moves against and the horizontal remains stationary; then a + 0.25 D cylinder is called for at axis 90°.

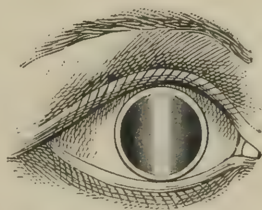

FIG. 19.—BAND OF LIGHT. ASTIGMATISM AXIS 90°.

Mixed Astigmatism.—In this condition of refraction, where one meridian is myopic and the meridian at right angles to it is hyperopic, the move-

ment of the retinal illumination in the myopic meridian will be controlled by the amount of the myopia. The illumination in the myopic meridian, if the myopia is less than one diopter, moves with the mirror, and against the movement of the mirror if it is more than one diopter; in this latter instance, where the movement of the myopic meridian is opposite to the movement of the mirror and with in the hyperopic meridian, the observer gets a distinct band of light in the meridians alternately as each meridian is neutralized separately with a sphere. Taking the following example,

$$-2.00 \text{ c. axis } 180^\circ \bigcirc + 1.00 \text{ c. axis } 90^\circ,$$

the 90 meridian shows an *opposite* movement, and in the horizontal the movement is *with* the movement of the mirror. If, now, a —1 D sphere be placed before the eye, the 90 meridian is neutralized for one meter distance, and a bright band of light is seen at 90°, moving with the movement of the mirror on the horizontal meridian. Removing the —1 D and placing a + 2 D before the eye, which would neutralize the horizontal meridian for one meter, a bright band will be seen on the horizontal axis and moving opposite to the movement of the mirror. Carrying out the rule of always adding a —1 D sphere to the correction obtained in the dark room at one meter, we have —1 added to the —1 in the vertical meridian, making —2 D, axis 180°; and adding —1 to the + 2 D in the horizontal, we have + 1 D for axis 90°, or our original formula:

$$-2.00 \text{ c. axis } 180^\circ \bigcirc + 1.00 \text{ c. axis } 90^\circ.$$

The rule for neutralizing lenses in mixed astigmatism is the same as for any other form of refraction; namely, using a plus lens when the movement is with, and a minus lens when the movement is opposite to, the movement of the light on the face.

Axonometer.—To find the exact axis subtended by the band of light while studying the retinal illumination, when the meridian of least ametropia has been corrected, the writer has suggested a small instrument which, for want of a better name, he has called an axonometer.

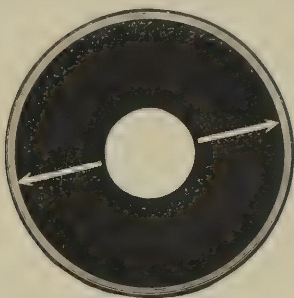

FIG. 20.

Figure 20 shows this instrument, and figure 21 the axonometer in position.

The description of this device was published in *The Medical News*, March 3, 1894, as follows: "The direction of the principal meridians of corneal curvature is often difficult to determine, and the statement of the patient must be accepted when confirming the shadow-test correction; or, if there is still uncertainty, the ophthalmometer of Javal must be brought into use. The axonometer is a black metal

disc, with a milled edge, one and one-half mm. in thickness, of the diameter of the ordinary trial-lens, and mounted in a cell of the trial-set. It has a central round opening 12 mm. in diameter—the diameter of the average cornea at its base. Two heavy white lines, one on each side, pass from the circumference across to the central opening, bisecting the disc. To use the axonometer, place it in the front opening of the trial-frame, and with the patient seated erect and frame accurately adjusted so that

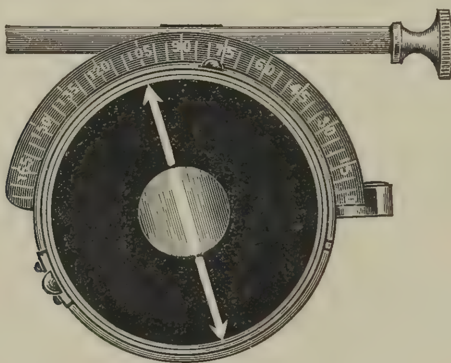

FIG. 21.

the cornea of the eye to be refracted occupies the central opening, proceed as in the usual method of making the shadow-test. As soon as that lens is found which corrects the meridian of least ametropia, and the band of light appears distinct, turn the axonometer slowly until the two heavy white lines accurately coincide, or appear to make one continuous line with the band of light. (See Fig. 21.)

"The degree marks on the trial-frame to which the arrow-head at the end of the white lines then

points is the exact axis for the cylinder. The axonometer possesses the following points of merit:

"Simplicity.

"Accuracy.

"Small expense.

"It covers an unnecessary part of the trial-lens which too frequently gives annoying reflexes and images.

"It saves time, avoids the statement of the patient, and renders the ophthalmometer unnecessary.

"Its color (black) absorbs the superfluous light rays from the mirror and gives a stronger contrast to the reflex and central illumination.

"Limiting the field of vision in children, it permits of more concentrated attention.

"For children and nervous patients, when it is difficult to use the ophthalmometer, this simple appliance is of great service."

CHAPTER VI.

RETINOSCOPY IN THE VARIOUS FORMS OF IRREGULAR AMETROPIA.—RETINOSCOPY WITHOUT A CYCLOPLEGIC.—THE CONCAVE MIRROR.—DESCRIPTION OF THE AUTHOR'S SCHEMATIC EYE AND LIGHT-SCREEN.

Irregular Astigmatism.—This condition is either in the cornea or in the lens; in any instance it is confusing to the beginner, and even the expert must work slowly to obtain a result. The corneal form is most difficult to refract, as the retinal illumination is more or less obscured by areas of darkness. The illumination between these dark areas appears to move with, in places, and in others against, the movement of the mirror. By moving the mirror so as to make the light describe a circle around the pupillary edge a most unique kinetoscopic picture is obtained, which is quite diagnostic of the condition. To refract an eye with this irregularity the observer may have to change his position several times to or from the patient. Very often these eyes are astigmatic, and the band of light may be promptly noted by the observer changing his position as suggested, and at the same time placing a neutralizing lens in position. Care *must* be taken, also, to refract in the area of the cornea that will correspond to the small pupil when the effect of the cycloplegic passes away. It is always best, in these cases of irregular corneal astigmatism, to retain the correction found

and use it to assist in a post-cycloplegic manifest refraction.

Irregular astigmatism of the lens is often more or less uniform, and not so broken as in the corneal variety. Figures 22 and 23 show two kinds of irregular lenticular astigmatism.

Figure 22 illustrates the spicules pointing in from the periphery, and as long as these do not encroach upon the pupillary area they do not usually interfere with vision; they are not often recognized until the pupil is dilated, are then very faint, and not usually

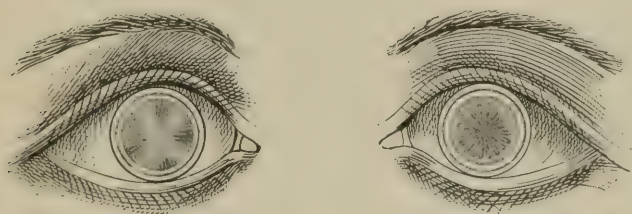

FIG. 22. FIG. 23.

IRREGULAR LENTICULAR ASTIGMATISM.

made out until the point of reversal is approached. Figure 23 is another form of irregular lenticular astigmatism, and a very interesting picture as studied with the retinoscope; and, as in figure 22, when very faint, is not made out until close to the point of reversal. These two forms of irregular lenticular astigmatism, when *just* beginning, are very seldom seen with the ophthalmoscope; the striations are too fine to be made out except under the conditions just described, and when recognized are of inestimable value from a point of prophylactic treatment, calling for a change of occupation, rest

to the eyes, and carefully selected glasses, the latter often being weak lenses. These two lenticular conditions not infrequently accompany the "flannel-red" fundus, the "fluffy eye ground," the "shot-silk retina," the "woolly choroid," etc.

Scissor Movement.—Another form of astigmatism that may be classed as irregular is where there are two bands of light seen on the horizontal meridian, or inclined a few degrees therefrom either way, and moving toward each other as the mirror is tilted in the opposite meridian; in other words, as the observer is seated at one meter he sees a band of light above and a band of light below, with a dark interspace, these bands coming together and again separating as the mirror is tilted in the vertical meridian. This movement of the bands is likened to the opening and closing of the scissor blades, and hence the name of scissor movement. In neutralizing a case of scissor movement, the observer must look carefully between the bands of light for the central retinal illumination, and to a great extent ignore the bands. The character of the astigmatism, so far as known, is *with* the rule.

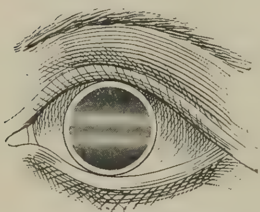

FIG. 24.—TWO BANDS OF LIGHT. SCISSOR MOVEMENT.

These cases are more or less difficult to refract, but the presence of the two bands of light will often assist in a correct selection of glasses, for while they are generally of the compound hyperopic variety, calling for a plus sphere and plus cylinder, yet prac-

tice and the patient's statement often call for a plus sphere and minus cylinder.

With the following formula,

$$+ 2.00 \text{ D} \bigcirc + 0.75 \text{ c. axis } 75°,$$

substituting a sphere the strength of the combined values of the sphere and cylinder, and using a minus cylinder of the same number as the plus cylinder at the opposite axis, the result will be,

$$+ 2.75 \text{ D} \bigcirc - 0.75 \text{ c. axis } 165°.$$

The vision with the latter formula is much better in many instances than with the former, and though either formula would be correct, yet the latter is practically the better of the two, and should be ordered when so found. The condition which may be the probable cause of the scissor movement is a slight tilting of the lens; that is, the antero-posterior axis of the lens does not stand perpendicular to the plane of the cornea, thus making one portion of the pupil myopic (band of light moving opposite) and the other portion hyperopic (band of light moving with the movement of the mirror). This condition may be simulated by placing a convex lens at an angle before the schematic eye, or reflecting the light into the eye obliquely. What causes the tilting of the lens, the writer is not prepared to state *positively*; it may be congenital, and yet careful inquiry of the patients, in many instances, has shown that it is most likely due to using the eyes to excess in the recumbent posture. It may be a coincidence, but most of the cases of scissor movement seen by the

author have been in adults, and those who were in the habit of reading while lying down, reading themselves to sleep at night in bed. Other cases were seen among paper-hangers, whose occupation compelled them to look upward much of the time. These do not seem unlikely causes, especially when the anatomy of the ciliary region is considered, the strain of the accommodation (possibly spasm) during the faulty position of the eye tilting the lens as it rests upon the vitreous body. The amount of the astigmatism resulting from this injurious position of using the eyes is not always in proportion to the length of time the habit has been persisted in. One patient had only half a diopter of astigmatism and had been in the habit of reading himself to sleep in bed, almost nightly for the preceding twenty years. As the writer has never seen or read of a case of monocular scissor movement he is disposed to believe that the causes suggested are the most plausible. The strength of cylinder in the scissor movement seldom exceeds one diopter, and is often less. This form of astigmatism, so far as known, remains a permanent one even after a cessation from the original cause and correcting glasses have been ordered. The retinoscope is the only instrument of precision we have in diagnosing this condition. The ophthalmoscope may recognize the presence of the astigmatism, but not its location or character.

Compound Irregular Astigmatism.—A hasty review of the literature of astigmatism does not reveal any reference to this form, and the name for the condition has been suggested by the following pic-

ture, namely: When studying the reflex, a vertical band of light will be seen passing across the pupillary area from left to right as the mirror is turned, and then in the vertical meridian (not necessarily at right angles) the scissor movement will be recognized also; there is, therefore, a combination of regular corneal astigmatism with the scissor movement, giving the compound name suggested. This form of astigmatism is rare, yet not difficult to diagnose or refract when understood. It is hoped, however, that the beginner in retinoscopy may not meet one of these on his first attempt at the human eye.

Conic Cornea. — Reflecting the light into an eye that has such a condition, the observer is impressed at once with the bright, round, central illumination that moves opposite to the movement of the mirror, the peripheral refraction moving with, unless perchance the margin should be myopic also, but of less degree. The best way to refract a case of this kind is to keep a record of the neutralizing lens required for the portion of the pupillary area that will correspond to the size of the pupil after the effect of the cycloplegic passes away, and use this record as a guide in a post-cycloplegic manifest correction, as in irregular corneal astigmatism.

Spheric Aberration.—This appears under two forms, positive or negative, and is the condition in which the peripheral refraction in the positive form is stronger than the central and in the negative weaker; that is to say, in the positive form, when the neutralizing lens has reduced the retinal illumination in size and increased its rate of movement, and the

point of reversal for the center of the pupil is close to one meter, the peripheral illumination grows broader and has a tendency to, and often will, crowd in upon the small central illumination, giving the idea of neutralization, or even the appearance of over-correction, the refraction in the periphery moving opposite. The observer must be on his guard for this condition, and while giving the mirror a slow and limited rotation must watch the illumination in the center of the pupil and not hasten the peripheral refraction. (See What to Avoid, p. 30, chap. IV.) The observer may have to approach the patient's eye closer than one meter if the peripheral refraction is very marked. The negative form is where the peripheral refraction is weak as compared to the central, which appears strong, and when the neutralizing lens gives a point of reversal at the center of the pupil the peripheral refraction still moves with the movement of the mirror. This condition is generally seen in cases of conic cornea.

Retinoscopy Without a Cycloplegic.—In cases of myopia and mixed astigmatism where the pupil is large, the refraction *can* be quickly and accurately obtained by the shadow-test without the use of a cycloplegic. This has been repeatedly proven by comparison of the manifest and cycloplegic results; yet it is not a method to be pursued, for two reasons: One is that the patients are not annoyed, like hyperopias, by the blurred vision incident to the cycloplegic; and, secondly, glasses ordered without the cycloplegic seldom give the comfort that follows from the physiologic rest the eye receives

from the drug. The surgeon will obtain much assistance and save time by using the retinoscope in cases of aphakia, in old people especially who are very slow to answer, and will insist upon a description of what they do and do not see, as also in rereading the test-card from the very top each time a change of lens is put in the trial-frame. Presbyopes of fifty or more years of age can be quickly and not inconveniently refracted by the shadow-test after having their pupils dilated with a weak (four per cent.) solution of cocain.

Concave Mirror.—While the study of retinoscopy with the concave mirror is not a part of the subject of this book, and allusion to it has been carefully avoided up to this time, yet for the benefit of those who may wish to try it, the writer would suggest that it will be necessary to place the source of light (20 or 30 mm. opening in light-screen) above and beyond the patient's head, one meter distant, or more, so that the convergent rays from the mirror come to a focus and cross before entering the observed eye. Then to estimate the refraction, proceed as with the plane mirror, remembering, however, that the movements of the retinal illumination are just the reverse of those obtained when using the plane mirror.

The Author's Schematic Eye for Studying Retinoscopy.—For illustration see figure 1 and the *Journal of the American Medical Association*, January 5, 1895. The eye as here shown, slightly reduced in size, is made of two brass cylinders, one somewhat smaller than its fellow, to permit slipping evenly into

the other. Both cylinders are well blackened inside, and the larger is also blackened outside. The smaller cylinder is closed at one end (concave surface), and on its inner surface is placed a colored lithograph of the normal eye ground. The larger cylinder is also closed at one end, except for a central round opening ten mm. in diameter, which is occupied by a + 16 D lens, and on its outer surface is a colored lithograph of the normal eye and its appendages; the pupil is left dilated, and corresponds to the central opening just referred to. In addition to the picture of the eye, there is also lithographed on the upper half of the periphery the degree marks similar to those on a trial-frame. To the lower half of the periphery are secured, at equal distances, three posts with grooves to hold trial-lenses. On the side of the small cylinder is an index which records emmetropia, and the amount of myopia and hyperopia, as it is pushed into or drawn out of the large cylinder. The eye is mounted on a convenient stand and upright, so that it may be moved as required. In using this eye, if the red eye ground and retinal vessels disturb the beginner then he may substitute a piece of white paper for the retina. To study astigmatism with the model, the beginner will have to place a cylinder, of known strength, in the groove next to the eye and study the characteristic band of light so diagnostic of this condition, and at the same time he should learn to locate the axis of the band with the axonometer.

The author's light-screen or cover chimney (see figure 3 and the *Annals of Ophthalmology*

and Otology, October, 1896) is made of one-eighth inch asbestos, and of sufficient size to fit easily over the glass chimney of the Argand burner; attached to the asbestos by means of a metal clamp are two superimposed discs which revolve independently of each other. The lower disc contains a piece of white porcelain, 30 mm. in diameter, also four round openings, respectively 5, 10, 20, and 35 mm. in diameter. The upper disc contains a round 35 mm. opening, a round section of blue cobalt glass, a perforated disc, a vertical and a horizontal slit, each 2½ by 25 mm. The several uses of this screen are as follows:

1. For the ophthalmoscope a good light is obtained by superimposing the two 35 mm. openings.

2. Combining the 35 mm. opening in the upper with either the 5 or 10 mm. in the lower disc a source of light is procured for the small retinoscope; and,

3. By substituting the 20 mm. opening, light is had for the concave mirror.

4. Placing the cobalt glass over the 5, 10, 20, or 35 mm. opening, and the chromo-aberration test of ametropia is given.

5. To test for astigmatism at one meter while using the plane mirror, or for heterophoria at six meters, the perforated disc is to be turned over the porcelain, the latter producing a clear white image.

6. The horizontal slit placed over the porcelain glass, and the operator may exercise the oblique muscles.

7. The vertical slit similarly placed gives the test for paralyzed muscles.

INDEX.

ABERRATION, 24, 59, 60
Accuracy, 27
Albino, 24
Amblyopia, 11
Aphakia, 11
Apparatus, 16, 34, 35, 36, 37, 51
Argand burner, 16
Arrangement, 20, 21
Astigmatism, 32, 46, 47, 48, 49, 54, 55, 56
Avoid, what to, 30, 31
Axiom, 10
Axonometer, 51, 52, 53

BAND of light, 32, 49
Beginner, 12

CENTRAL shadow, 14, 15
Concave mirror, 17, 61
Conic cornea, 59, 60
Conjugate focus, 29
Cover chimney, 16, 62, 63
Cycloplegic, 18, 60

DARK room, 16, 17
Definition, 9
Dioptroscopy, 9
Direction of movement, 26, 31
Discs, 34, 35
Distance, 20

EMMETROPIA, 40, 41, 42
Examples, 27, 46

FACIAL illumination, 28
Fantoscopy, 9
Far point, 27, 39, 40, 41, 43
Form of retinal illumination, 26, 32
Fundus reflex-test, 9

GENERAL appearances, 23, 24

HOW to use the mirror, 22, 23
Hyperopia, 38, 39, 40

ILLITERATES, 11
Illumination, facial, 28
retinal, 24, 25
Illustrations, 12, 15, 16, 21, 22, 25, 33, 34, 35, 39, 40, 41, 42, 43, 47, 49, 51, 52, 55, 56
Images, 30
Irregular astigmatism, 54, 55, 56, 57, 58, 59

JACKSON, iii, 14
Jennings, 34

KERATOSCOPY, 9

LENSES, 30, 32, 33
Lenticular astigmatism, 55, 56, 57
Light, 15
Light-screen, 16, 62, 63

METER distance, 18, 19, 21, 31, 32
Mirror, 14, 15, 22
Mixed astigmatism, 49, 50, 51
Movement of light, 17, 18
mirror, 33, 34
Mulatto, 24
Myopia, 42, 43, 44, 45

NAME, 9
Negative aberration, 59, 60
Neutralizing lens, 30, 32, 33, 45, 51
Nystagmus, 11

OBSERVER, 18
Oliver, 9

PATIENT, 18, 19
Point of reversal, 27
  to find, 27, 28, 29, 30
Position of light, 17
  mirror, 17
  observer, 18
  patient, 18
Positive aberration, 59, 60
Principle of retinoscopy, 9
Pupillary area, 26
Pupilloscopy, 9
Punctum remotum, 27, 44

RATE of movement, 26, 32
Reflection from mirror, 17, 18, 21, 22
  lenses, 30, 31
Regular astigmatism, 46, 47, 48, 49, 50
Retinal illumination, 24, 25
Retinophotoscopy, 9
Retinoscope, 14, 15, 22
Retinoscopy, 9
  without a cycloplegic, 60, 61
Retinoskiascopy, 9
Reversal of movement, 27, 28, 29, 30, 38, 40, 43, 44, 49
Room, 16, 17

SCHEMATIC eye, 12, 61, 62
Scissor movement, 56, 57, 58
Shade, 16
Shadow, 25, 26
Shadow-test, 25
Sight-hole, 15
Size of mirror, 14
  retinal illumination, 26
Skiascopy, 9
Source of light, 17, 18
Spheric aberration, 59, 60
Squint, 19

THORINGTON, 12, 15, 16, 22
Trial-frame, 37

UMBRASCOPY, 9

VALUE of Retinoscopy, 10, 11, 12

WELSBACH, 15
What the observer sees, 23, 24
  to avoid, 30, 31
Where and what to look for, 26
Würdemann, 34

YOUNG children, 11, 53

Catalogue No. 8. March, 1897.

CLASSIFIED SUBJECT CATALOGUE

OF

MEDICAL BOOKS

AND

Books on Medicine, Dentistry, Pharmacy, Chemistry, Hygiene, Etc., Etc.,

PUBLISHED BY

P. BLAKISTON, SON & CO.,

Medical Publishers and Booksellers,

1012 WALNUT STREET, PHILADELPHIA.

SPECIAL NOTE.—The prices given in this catalogue are absolutely net, no discount will be allowed retail purchasers under any consideration. This rule has been established in order that everyone will be treated alike, a general reduction in former prices having been made to meet previous retail discounts. Upon receipt of the advertised price any book will be forwarded by mail or express, **all charges prepaid.**

We keep a large stock of Miscellaneous Books, not on this catalogue, relating to Medicine and Allied Sciences, pub lished in this country and abroad. Inquiries in regard to prices, date of edition, etc., will receive prompt attention.

Special Catalogues of Books on Pharmacy, Dentistry, Chemistry, Hygiene, and Nursing will be sent free upon application.

☞ SEE NEXT PAGE FOR SUBJECT INDEX.

Gould's Dictionaries, Page 8.

SUBJECT INDEX.

☞ **Any books not on this Catalogue we will furnish a price for upon application.**

SUBJECT.	PAGE
Alimentary Canal (see Surgery)	19
Anatomy	3
Anesthetics	3
Autopsies (see Pathology)	16
Bandaging (see Surgery)	19
Brain	4
Chemistry	4
Children, Diseases of	6
Clinical Charts	6
Compends	22, 23
Consumption (see Lungs)	12
Deformities	7
Dentistry	7
Diagnosis	17
Diagrams (see Anatomy, page 3, and Obstetrics, page 16).	
Dictionaries	8
Diet and Food (see Miscellaneous)	14
Dissectors	3
Domestic Medicine	10
Ear	8
Electricity	9
Emergencies (see Surgery)	19
Eye	9
Fevers	9
Gout	10
Gynecology	21
Headaches	10
Heart	10
Histology	10
Hospitals (see Hygiene)	11
Hygiene	11
Insanity	4
Journals	11
Kidneys	12
Latin, Medical (see Miscellaneous and Pharmacy)	14, 16
Lungs	12
Massage	12
Materia Medica	12
Medical Jurisprudence	13
Microscopy	13
Milk Analysis (see Chemistry)	4
Miscellaneous	14
Nervous Diseases	14
Nose	20
Nursing	15
Obstetrics	16
Ophthalmology	9
Osteology (see Anatomy)	3
Pathology	16
Pharmacy	16
Physical Diagnosis	17
Physical Training (see Miscellaneous)	14
Physiology	18
Poisons (see Toxicology)	13
Popular Medicine	10
Practice of Medicine	18
Prescription Books	18
Railroad Injuries (see Nervous Diseases)	14
Refraction (see Eye)	9
Rheumatism	10
Sanitary Science	11
Skin	19
Spectacles (see Eye)	9
Spine (see Nervous Diseases)	14
Stomach (see Miscellaneous)	14
Students' Compends	22, 23
Surgery and Surg. Diseases	19
Syphilis	21
Technological Books	4
Temperature Charts	6
Therapeutics	12
Throat	20
Toxicology	13
U S. Pharmacopœia	16
Urinary Organs	20
Urine	20
Venereal Diseases	21
Veterinary Medicine	21
Visiting Lists, Physicians'. (*Send for Special Circular.*)	
Water Analysis (see Chemistry)	11
Women, Diseases of	21

☞ *The prices as given in this Catalogue are net. Cloth binding, unless otherwise specified. No discount can be allowed under any circumstances. Any book will be sent, postpaid, upon receipt of advertised price.*

☞ ***All books are bound in cloth, unless otherwise specified. All prices are net.***

ANATOMY.

MORRIS. Text-Book of Anatomy. 791 Illus., 214 of which are printed in colors. Clo., $6.00; Lea., $7.00; Half Russia, $8.00.

"Taken as a whole, we have no hesitation in according very high praise to this work. It will rank, we believe, with the leading Anatomies. The illustrations are handsome and the printing is good."—*Boston Medical and Surgical Journal.*

Handsome Circular of Morris, with sample pages and colored illustrations, will be sent free to any address.

CAMPBELL. Outlines for Dissection. Prepared for Use with "Morris's Anatomy" by the Demonstrator of Anatomy at the University of Michigan. $1.00

HEATH. Practical Anatomy. A Manual of Dissections. 8th Edition. 300 Illustrations. $4.25

HOLDEN. Anatomy. A Manual of the Dissections of the Human Body. 6th Edition. Carefully Revised by A. HEWSON, M.D., Demonstrator of Anatomy, Jefferson Medical College, Philadelphia. 311 Illustrations. Cloth, $2.50; Oil-Cloth, $2.50; Leather, $3.00

HOLDEN. Human Osteology. Comprising a Description of the Bones, with Colored Delineations of the Attachments of the Muscles. The General and Microscopical Structure of Bone and its Development. With Lithographic Plates and numerous Illus. 7th Ed. $5.25

HOLDEN. Landmarks. Medical and Surgical. 4th Ed. $1.00

MACALISTER. Human Anatomy. Systematic and Topographical, including the Embryology, Histology, and Morphology of Man. With Special Reference to the Requirements of Practical Surgery and Medicine. 816 Illustrations, 400 of which are original. Cloth, $5.00; Leather, $6.00

MARSHALL. Physiological Diagrams. Life Size, Colored. Eleven Life-Size Diagrams (each seven feet by three feet seven inches). Designed for Demonstration before the Class.

In Sheets, Unmounted, $40.00; Backed with Muslin and Mounted on Rollers, $60.00; Ditto, Spring Rollers, in Handsome Walnut Wall Map Case (send for special circular), $100.00; Single Plates—Sheets, $5.00; Mounted, $7.50. Explanatory Key, .50. *Descriptive circular upon application.*

POTTER. Compend of Anatomy, Including Visceral Anatomy. 5th Edition. 16 Lithographed Plates and 117 other Illustrations. .80; Interleaved, $1.25

WILSON. Human Anatomy. 11th Edition. 429 Illustrations, 26 Colored Plates, and a Glossary of Terms. $5.00

WINDLE. Surface Anatomy and Landmarks. Colored and other Illustrations. *Just Ready.* $1.00

ANESTHETICS.

BUXTON. On Anesthetics. 2d Edition. Illustrated. $1.25

TURNBULL. Artificial Anesthesia. The Advantages and Accidents of; Its Employment in the Treatment of Disease; Modes of Administration; Considering their Relative Risks; Tests of Purity; Treatment of Asphyxia; Spasms of the Glottis; Syncope, etc. 4th Edition, Revised. 54 Illustrations. *Just Ready.* $2.50

BRAIN AND INSANITY.

BLACKBURN. A Manual of Autopsies. Designed for the Use of Hospitals for the Insane and other Public Institutions. Ten full-page Plates and other Illustrations. $1.25

GOWERS. Diagnosis of Diseases of the Brain. 2d Edition. Illustrated. $1.50

HORSLEY. The Brain and Spinal Cord. The Structure and Functions of. Numerous Illustrations. $2.50

HYSLOP. Mental Physiology. Especially in Relation to Mental Disorders. With Illustrations. $4.25

LEWIS (BEVAN). Mental Diseases. A Text-Book Having Special Reference to the Pathological Aspects of Insanity. 18 Lithographic Plates and other Illustrations. New Edition. *In Press.*

MANN. Manual of Psychological Medicine and Allied Nervous Diseases. Their Diagnosis, Pathology, Prognosis, and Treatment, including their Medico-Legal Aspects; with chapter on Expert Testimony, and an Abstract of the Laws Relating to the Insane in all the States of the Union. Illustrations of Typical Faces of the Insane, Handwriting of the Insane, and Micro-photographic Sections of the Brain and Spinal Cord. $3.00

REGIS. Mental Medicine. Authorized Translation by H. M. Bannister, M.D. $2.00

STEARNS. Mental Diseases. Designed especially for Medical Students and General Practitioners. With a Digest of Laws of the various States Relating to Care of Insane. Illustrated. Cloth, $2.75; Sheep, $3.25

TUKE. Dictionary of Psychological Medicine. Giving the Definition, Etymology, and Symptoms of the Terms used in Medical Psychology, with the Symptoms, Pathology, and Treatment of the Recognized Forms of Mental Disorders, together with the Law of Lunacy in Great Britain and Ireland. Two volumes. $10.00

WOOD, H. C. Brain and Overwork. .40

CHEMISTRY AND TECHNOLOGY.

Special Catalogue of Chemical Books sent free upon application.

ALLEN. Commercial Organic Analysis. A Treatise on the Modes of Assaying the Various Organic Chemicals and Products Employed in the Arts, Manufactures, Medicine, etc., with concise methods for the Detection of Impurities, Adulterations, etc. 2d Ed. Vol. I, Vol. II, Vol. III, Part I. *These volumes cannot be had.*
- Vol. III, Part II. The Amins. Pyridin and its Hydrozins and Derivatives. The Antipyretics, etc. Vegetable Alkaloids, Tea, Coffee, Cocoa, etc. $4.50
- Vol. III, Part III. Animal Bases, Animal Acids, Cyanogen Compounds, Proteids, etc. $4.50
- Vol. III, Part IV. The Proteids and Albuminoids. *In Press.*

ALLEN. Chemical Analysis of Albuminous and Diabetic Urine. Illustrated. $2.25

BARTLEY. Medical and Pharmaceutical Chemistry. A Text-Book for Medical, Dental, and Pharmaceutical Students. With Illustrations, Glossary, and Complete Index. 4th Edition, carefully Revised. Cloth, $2.75; Sheep, $3.25

BLOXAM. Chemistry, Inorganic and Organic. With Experiments. 8th Ed., Revised. 281 Engravings. Clo., $4.25; Lea., $5.25

CALDWELL. Elements of Qualitative and Quantitative Chemical Analysis. 3d Edition, Revised. $1.50

CAMERON. Oils and Varnishes. With Illustrations, Formulæ, Tables, etc. $2.25

CAMERON. Soap and Candles. 54 Illustrations. $2.00

CLOWES AND COLEMAN. Elementary Qualitative Analysis. Adapted for Use in the Laboratories of Schools and Colleges. Illustrated. $1.00

GARDNER. The Brewer, Distiller, and Wine Manufacturer. A Hand-Book for all Interested in the Manufacture and Trade of Alcohol and Its Compounds. Illustrated. $1.50

GARDNER. Bleaching, Dyeing, and Calico Printing. With Formulæ. Illustrated. $1.50

GROVES AND THORP. Chemical Technology. The Application of Chemistry to the Arts and Manufactures. 8 Volumes, with numerous Illustrations.
Vol. I. Fuel and Its Applications. 607 Illustrations and 4 Plates. Cloth, $5.00; Half Morocco, $6.50
Vol. II. Lighting. Illustrated. Cloth, $4.00; Half Morocco, $5.50
Vol. III. Lighting—Continued. *In Press.*

HOLLAND. The Urine, the Gastric Contents, the Common Poisons, and the Milk. Memoranda, Chemical and Microscopical, for Laboratory Use. 5th Ed. Illustrated and interleaved, $1.00

LEFFMANN. Compend of Medical Chemistry, Inorganic and Organic. Including Urine Analysis. 4th Edition, Rewritten. .80; Interleaved, $1.25

LEFFMANN. Progressive Exercises in Practical Chemistry. Illustrated. 2d Edition. $1.00

LEFFMANN. Analysis of Milk and Milk Products. Arranged to Suit the Needs of Analytical Chemists, Dairymen, and Milk Inspectors. 2d Edition. Enlarged, Illustrated. *Just Ready.* $1.25

LEFFMANN. Water Analysis. Illustrated. 3d Edition. $1.25

LEFFMANN. Structural Formulæ for the Use of Students. Including 180 Structural and Stereo-Chemical Formulæ. 12mo. Interleaved. *Just Ready.* $1.00

MÜTER. Practical and Analytical Chemistry. 4th Edition. Revised to meet the requirements of American Medical Colleges by CLAUDE C. HAMILTON, M.D. 51 Illustrations. $1.25

OVERMAN. Practical Mineralogy, Assaying, and Mining. With a Description of the Useful Minerals, etc. 11th Edition. $1.00

RICHTER. Inorganic Chemistry. 4th American, from 6th German Edition. Authorized translation by EDGAR F. SMITH, M.A., PH.D. 89 Illustrations and a Colored Plate. $1.75

RICHTER. Organic Chemistry. 3d American Edition. Trans. from the last German by EDGAR F. SMITH. Illustrated. *In Press.*

SMITH. Electro-Chemical Analysis. 2d Edition, Revised. 28 Illustrations. $1.25

SMITH AND KELLER. Experiments. Arranged for Students in General Chemistry. 3d Edition. Illustrated. .60

STAMMER. Chemical Problems. With Explanations and Answers. .50

SUTTON. Volumetric Analysis. A Systematic Handbook for the Quantitative Estimation of Chemical Substances by Measure, Applied to Liquids, Solids, and Gases. 7th Edition, Revised. 112 Illustrations. *Just Ready.* $4.50

SYMONDS. Manual of Chemistry, for Medical Students. 2d Edition. $2.00

WATTS. Organic Chemistry. 2d Edition. By WM. A. TILDEN, D.SC., F.R.S. (Being the 13th Edition of Fowne's Organic Chemistry.) Illustrated. $2 00

WATTS. Inorganic Chemistry. Physical and Inorganic. (Being the 14th Edition of Fowne's Physical and Inorganic Chemistry.) With Colored Plate of Spectra and other Illustrations. $2.00

WOODY. Essentials of Chemistry and Urinalysis. 4th Edition. Illustrated. *In Press.*

*** *Special Catalogue of Books on Chemistry free upon application.*

CHILDREN.

CAUTLIE. Feeding of Infants and Young Children by Natural and Artificial Methods. *Just Ready.* $2.00

HALE. On the Management of Children in Health and Disease. .50

HATFIELD. Compend of Diseases of Children. With a Colored Plate. 2d Edition. .80; Interleaved, $1.25

MEIGS. Infant Feeding and Milk Analysis. The Examination of Human and Cow's Milk, Cream, Condensed Milk, etc., and Directions as to the Diet of Young Infants. .50

MONEY. Treatment of Diseases in Children. Including the Outlines of Diagnosis and the Chief Pathological Differences Between Children and Adults. 2d Edition. $2.50

POWER. Surgical Diseases of Children and their Treatment by Modern Methods. Illustrated. $2.50

STARR. The Digestive Organs in Childhood. The Diseases of the Digestive Organs in Infancy and Childhood. With Chapters on the Investigation of Disease and the Management of Children. 2d Edition, Enlarged. Illustrated by two Colored Plates and numerous Wood Engravings. $2 00

STARR. Hygiene of the Nursery. Including the General Regimen and Feeding of Infants and Children, and the Domestic Management of the Ordinary Emergencies of Early Life, Massage, etc. 5th Edition. 25 Illustrations. *Just Ready.* $1.00

TAYLOR AND WELLS. Diseases of Children. Illustrated. A New Text-Book. *Nearly Ready.*

CLINICAL CHARTS.

GRIFFITH. Graphic Clinical Chart. Printed in three colors. Sample copies free. Put up in loose packages of fifty, .50. Price to Hospitals, 500 copies, $4.00; 1000 copies, $7.50. With name of Hospital printed on, .50 extra.

TEMPERATURE CHARTS. For Recording Temperature, Respiration, Pulse, Day of Disease, Date, Age, Sex, Occupation, Name, etc. Put up in pads of fifty. Each, .50

DEFORMITIES.

REEVES. Bodily Deformities and Their Treatment. A Hand-Book of Practical Orthopedics. 228 Illustrations. $1.75

HEATH Injuries and Diseases of the Jaws. 187 Illustrations. 4th Edition. Cloth, $4.50

DENTISTRY.

Special Catalogue of Dental Books sent free upon application.

BARRETT. Dental Surgery for General Practitioners and Students of Medicine and Dentistry. Extraction of Teeth, etc. 3d Edition. Illustrated. *Nearly Ready.*

BLODGETT. Dental Pathology. By ALBERT N. BLODGETT, M D., late Professor of Pathology and Therapeutics, Boston Dental College. 33 Illustrations. $1.25

FLAGG. Plastics and Plastic Filling, as Pertaining to the Filling of Cavities in Teeth of all Grades of Structure. 4th Edition. $4.00

FILLEBROWN. A Text-Book of Operative Dentistry. Written by invitation of the National Association of Dental Faculties. Illustrated. $2.25

GORGAS. Dental Medicine. A Manual of Materia Medica and Therapeutics. 5th Edition, Revised. Cloth, $4.00; Sheep, $5.00

HARRIS. Principles and Practice of Dentistry. Including Anatomy, Physiology, Pathology, Therapeutics, Dental Surgery, and Mechanism. 13th Edition. Revised by F. J. S. GORGAS, M.D., D.D.S. 1250 Illustrations. Cloth, $6.00; Leather, $7.00

HARRIS. Dictionary of Dentistry. Including Definitions of Such Words and Phrases of the Collateral Sciences as Pertain to the Art and Practice of Dentistry. 5th Edition. Revised and Enlarged by FERDINAND F. S. GORGAS, M D., D.D.S. Cloth, $4.50; Leather, $5.50

HEATH. Injuries and Diseases of the Jaws. 4th Edition 187 Illustrations. $4.50

HEATH. Lectures on Certain Diseases of the Jaws. 64 Illustrations. Boards, .50

RICHARDSON. Mechanical Dentistry. 7th Edition. Thoroughly Revised by DR. GEO. W. WARREN. 647 Illustrations. *Just Ready.* Cloth, $5.00; Leather, $6.00

SEWELL. Dental Surgery. Including Special Anatomy and Surgery. 3d Edition, with 200 Illustrations. $2 00

TAFT. Operative Dentistry. A Practical Treatise. 4th Edition. 100 Illustrations. Cloth, $3.00; Leather, $4.00

TAFT. Index of Dental Periodical Literature. $2.00

TALBOT. Irregularities of the Teeth and Their Treatment. 2d Edition. 234 Illustrations. $3 00

TOMES. Dental Anatomy. Human and Comparative. 235 Illustrations. 4th Edition. $3.50

TOMES. Dental Surgery. 3d Edition. 292 Illustrations. $4.00

WARREN. Compend of Dental Pathology and Dental Medicine. With a Chapter on Emergencies. Illustrated. .80; Interleaved, $1.25

WARREN. Dental Prosthesis and Metallurgy. 129 Ills. $1.25

WHITE. The Mouth and Teeth. Illustrated. .40

*** *Special Catalogue Dental Books free upon application.*

DICTIONARIES.

GOULD. The Illustrated Dictionary of Medicine, Biology, and Allied Sciences. Being an Exhaustive Lexicon of Medicine and those Sciences Collateral to it: Biology (Zoology and Botany), Chemistry, Dentistry, Parmacology, Microscopy, etc., with many useful Tables and numerous fine Illustrations. 1633 pages. 3d Ed.
Sheep or Half Dark Green Leather, $10.00; Thumb Index, $11.00
Half Russia, Thumb Index, $12.00

GOULD. The Medical Student's Dictionary. Including all the Words and Phrases Generally Used in Medicine, with their Proper Pronunciation and Definition, Based on Recent Medical Literature. With Tables of the Bacilli, Micrococci, Mineral Springs, etc., of the Arteries, Muscles, Nerves, Ganglia, and Plexuses, etc. **10th Edition. Rewritten and Enlarged.** Completely reset from new type. 700 pp.
Half Dark Leather, $3.25; Half Morocco, Thumb Index, $4.00

GOULD. The Pocket Pronouncing Medical Lexicon. (12,000 Medical Words Pronounced and Defined.) Containing all the Words, their Definition and Pronunciation, that the Medical, Dental, or Pharmaceutical Student Generally Comes in Contact With; also Elaborate Tables of the Arteries, Muscles, Nerves, Bacilli, etc., etc., a Dose List in both English and Metric System, etc., Arranged in a Most Convenient Form for Reference and Memorizing.
Full Limp Leather, Gilt Edges, $1.00; Thumb Index, $1.25

50,000 Copies of Gould's Dictionaries Have Been Sold.

*** Sample Pages and Illustrations and Descriptive Circulars of Gould's Dictionaries sent free upon application.

HARRIS. Dictionary of Dentistry. Including Definitions of Such Words and Phrases of the Collateral Sciences as Pertain to the Art and Practice of Dentistry. 5th Edition. Revised and Enlarged by FERDINAND J. S. GORGAS, M.D., D.D.S. Cloth, $4.50; Leather, $5.50

LONGLEY. Pocket Medical Dictionary. With an Appendix, containing Poisons and their Antidotes, Abbreviations used in Prescriptions, etc. Cloth, .75; Tucks and Pocket, $1.00

CLEVELAND. Pocket Medical Dictionary. 33d Edition. Very small pocket size. Cloth, .50; Tucks with Pocket, .75

MAXWELL. Terminologia Medica Polyglotta. By Dr. THEODORE MAXWELL, Assisted by Others. $3.00

The object of this work is to assist the medical men of any nationality in reading medical literature written in a language not their own. Each term is usually given in seven languages, viz.: English, French, German, Italian, Spanish, Russian, and Latin.

TREVES AND LANG. German-English Medical Dictionary.
Half Russia, $3.25

EAR (see also Throat and Nose).

HOVELL. Diseases of the Ear and Naso-Pharynx. Including Anatomy and Physiology of the Organ, together with the Treatment of the Affections of the Nose and Pharynx which Conduce to Aural Disease. 122 Illustrations. $5.00

BURNETT. Hearing and How to Keep It. Illustrated. .40

DALBY. Diseases and Injuries of the Ear. 4th Edition. 38 Wood Engravings and 8 Colored Plates. $2.50

PRITCHARD. Diseases of the Ear. 3d Edition, Enlarged. Many Illustrations and Formulæ. *Just Ready.* $1.50

WOAKES. Deafness, Giddiness, and Noises in the Head. 4th Edition. Illustrated. *Just Ready.* $2.00

ELECTRICITY.

BIGELOW. Plain Talks on Medical Electricity and Batteries. With a Therapeutic Index and a Glossary. 43 Illustrations. 2d Edition. $1.00

JONES. Medical Electricity. 2d Edition. 112 Illustrations. $2.50

MASON. Electricity; Its Medical and Surgical Uses. Numerous Illustrations. .75

EYE.

A Special Circular of Books on the Eye sent free upon application.

ARLT. Diseases of the Eye. Clinical Studies on Diseases of the Eye. Authorized Translation by LYMAN WARE, M.D. Illustrated. $1.25

FICK. Diseases of the Eye and Ophthalmoscopy. Translated by A. B. HALE, M. D. 157 Illustrations, many of which are in colors, and a glossary. *Just Ready.* Cloth, $4.50; Sheep, $5.50

GOULD AND PYLE. Compend of Diseases of the Eye and Refraction. Illustrated. *Just Ready.* Cloth, .80; Interleaved, $1.00

GOWERS. Medical Ophthalmoscopy. A Manual and Atlas with Colored Autotype and Lithographic Plates and Wood-cuts, Comprising Original Illustrations of the Changes of the Eye in Diseases of the Brain, Kidney, etc. 3d Edition. $4.00

HARLAN. Eyesight, and How to Care for It. Illus. .40

HARTRIDGE. Refraction. 96 Illustrations and Test Types. 8th Edition, Enlarged. $1.50

HARTRIDGE. On the Ophthalmoscope. 2d Edition. With Colored Plate and many Wood-cuts. $1.25

HANSELL AND BELL. Clinical Ophthalmology. Colored Plate of Normal Fundus and 120 Illustrations. $1.50

MACNAMARA. On the Eye. 5th Edition. Numerous Colored Plates, Diagrams of Eye, Wood-cuts, and Test Types. $3.50

MORTON. Refraction of the Eye. Its Diagnosis and the Correction of its Errors. With Chapter on Keratoscopy and Test Types. 6th Edition. $1.00

OHLEMANN. Ocular Therapeutics. Authorized Translation, and Edited by DR. CHARLES A. OLIVER. *In Press.*

PHILLIPS. Spectacles and Eyeglasses. Their Prescription and Adjustment. 2d Edition. 49 Illustrations. $1.00

SWANZY. Diseases of the Eye and Their Treatment. 6th Edition, Revised and Enlarged. 158 Illustrations, 1 Plain Plate, and a Zephyr Test Card. *Just Ready.* $3.00

THORINGTON. Retinoscopy. Illustrated. *Just Ready.* $1.00

WALKER. Students' Aid in Ophthalmology. Colored Plate and 40 other Illustrations and Glossary. $1.50

FEVERS.

COLLIE. On Fevers. Their History, Etiology, Diagnosis, Prognosis, and Treatment. Colored Plates. $2.00

GOODALL AND WASHBOURN. Fevers and Their Treatment. Illustrated. *Just Ready.* $3.00

GOUT AND RHEUMATISM.

DUCKWORTH. A Treatise on Gout. With Chromo-lithographs and Engravings. Cloth, $6.00

GARROD. On Rheumatism. A Treatise on Rheumatism and Rheumatic Arthritis. Cloth, $5.00

HAIG. Causation of Disease by Uric Acid. A Contribution to the Pathology of High Arterial Tension, Headache, Epilepsy, Gout, Rheumatism, Diabetes, Bright's Disease, etc. 3d Edition. $3.00

HEADACHES.

DAY. On Headaches. The Nature, Causes, and Treatment of Headaches. 4th Edition. Illustrated. $1.00

HEALTH AND DOMESTIC MEDICINE (see also Hygiene and Nursing).

BUCKLEY. The Skin in Health and Disease. Illus.	.40
BURNETT. Hearing and How to Keep It. Illustrated.	.40
COHEN. The Throat and Voice. Illustrated.	.40
DULLES. Emergencies. 4th Edition. Illustrated.	$1.00
HARLAN. Eyesight and How to Care for It. Illustrated.	.40
HARTSHORNE. Our Homes. Illustrated.	.40
OSGOOD. The Winter and its Dangers.	.40
PACKARD. Sea Air and Bathing.	.40
PARKES. The Elements of Health. *Just Ready.*	$1.25
RICHARDSON. Long Life and How to Reach It.	.40
WESTLAND. The Wife and Mother.	$1.50
WHITE. The Mouth and Teeth. Illustrated.	.40
WILSON. The Summer and its Diseases.	.40
WOOD. Brain Work and Overwork.	.40
STARR. Hygiene of the Nursery. 5th Edition.	$1.00
CANFIELD. Hygiene of the Sick-Room.	$1.25

HEART.

SANSOM. Diseases of the Heart. The Diagnosis and Pathology of Diseases of the Heart and Thoracic Aorta. With Plates and other Illustrations. $6.00

HISTOLOGY.

STIRLING. Outlines of Practical Histology. 368 Illustrations. 2d Edition, Revised and Enlarged. With new Illustrations. $2.00

STÖHR. Histology and Microscopical Anatomy. Translated and Edited by A. SHAPER, M.D., Harvard Medical School. 268 Illustrations. *Just Ready.* $3.00

HYGIENE AND WATER ANALYSIS.

Special Catalogue of Books on Hygiene sent free upon application.

CANFIELD. Hygiene of the Sick-Room. A Book for Nurses and Others Being a Brief Consideration of Asepsis, Antisepsis, Disinfection, Bacteriology, Immunity, Heating and Ventilation, and Kindred Subjects. $1.25

COPLIN AND BEVAN. Practical Hygiene. A Complete American Text-Book. 138 Illustrations. Cloth, $3.25; Sheep, $4.25

FOX. Water, Air, and Food. Sanitary Examinations of Water, Air, and Food. 100 Engravings. 2d Edition, Revised. $3.50

KENWOOD. Public Health Laboratory Work. 116 Illustrations and 3 Plates. $2.00

LEFFMANN. Examination of Water for Sanitary and Technical Purposes. 3d Edition. Illustrated. $1.25

LEFFMANN. Analysis of Milk and Milk Products. Illustrated. $1.25

LINCOLN. School and Industrial Hygiene. .40

MACDONALD. Microscopical Examinations of Water and Air. 25 Lithographic Plates, Reference Tables, etc. 2d Ed. $2 50

McNEILL. The Prevention of Epidemics and the Construction and Management of Isolation Hospitals. Numerous Plans and Illustrations. $3.50

NOTTER AND FIRTH. The Theory and Practice of Hygiene. (Being the 9th Edition of Parkes' Practical Hygiene, rewritten and brought up to date.) 10 Plates and 135 other Illustrations. 1034 pages. 8vo. *Just Ready.* $7.00

PARKES. Hygiene and Public Health. By Louis C. Parkes, M.D. 5th Edition. Enlarged. Illustrated. *In Press.*

PARKES. Popular Hygiene. The Elements of Health. A Book for Lay Readers. Illustrated. $1.25

STARR. The Hygiene of the Nursery. Including the General Regimen and Feeding of Infants and Children, and the Domestic Management of the Ordinary Emergencies of Early Life, Massage, etc. 5th Edition. 25 Illustrations. *Just Ready.* $1.00

STEVENSON AND MURPHY. A Treatise on Hygiene. By Various Authors. In Three Octave Volumes. Illustrated.
Vol. I, $6.00; Vol. II, $6.00; Vol. III, $5.00

*** Each Volume sold separately. Special Circular upon application.

WILSON. Hand-Book of Hygiene and Sanitary Science. With Illustrations. 7th Edition. $3 00

WEYL. Sanitary Relations of the Coal-Tar Colors. Authorized Translation by HENRY LEFFMANN, M.D., PH.D. $1.25

*** *Special Catalogue of Books on Hygiene free upon application.*

JOURNALS, ETC.

OPHTHALMIC REVIEW. A Monthly Record of Ophthalmic Science. Publ. in London. Sample number .25; per annum $3.00

NEW SYDENHAM SOCIETY PUBLICATION. Three to six volumes each year. Circular upon application. Per annum $8.00

KIDNEY DISEASES.

THORNTON. The Surgery of the Kidney. 19 Illus. Clo., $1.50

TYSON. Bright's Disease and Diabetes. With Especial Reference to Pathology and Therapeutics. Including a Section on Retinitis in Bright's Disease. New Edition. *In Preparation.*

LUNGS AND PLEURÆ.

HARRIS AND BEALE. Treatment of Pulmonary Consumption. $2.50

POWELL. Diseases of the Lungs and Pleuræ, including Consumption. Colored Plates and other Illus. 4th Ed. $4.00

TUSSEY. High Altitudes in the Treatment of Consumption. *Just Ready.* $1.50

MASSAGE.

KLEEN. Hand-Book of Massage. Authorized translation by MUSSEY HARTWELL, M.D., PH.D. With an Introduction by Dr. S. WEIR MITCHELL. Illustrated by a series of Photographs Made Especially by DR. KLEEN for the American Edition. $2.25

MURRELL. Massotherapeutics. Massage as a Mode of Treatment. 5th Edition. $1.25

OSTROM. Massage and the Original Swedish Movements. Their Application to Various Diseases of the Body. A Manual for Students, Nurses, and Physicians. Third Edition, Enlarged. 94 Wood Engravings, many of which are original. $1.00

MATERIA MEDICA AND THERAPEUTICS.

ALLEN, HARLAN, HARTE, VAN HARLINGEN. A Hand-Book of Local Therapeutics, Being a Practical Description of all those Agents Used in the Local Treatment of Diseases of the Eye, Ear, Nose and Throat, Mouth, Skin, Vagina, Rectum, etc., such as Ointments, Plasters, Powders, Lotions, Inhalations, Suppositories, Bougies, Tampons, and the Proper Methods of Preparing and Applying Them. Cloth, $3.00; Sheep, $4.00

BIDDLE. Materia Medica and Therapeutics. Including Dose List, Dietary for the Sick, Table of Parasites, and Memoranda of New Remedies. 13th Edition, Thoroughly Revised in accordance with the new U. S. P. 64 Illustrations and a Clinical Index. Cloth, $4.00; Sheep, $5.00

BRACKEN. Outlines of Materia Medica and Pharmacology. By H. M. BRACKEN, Professor of Materia Medica and Therapeutics and of Clinical Medicine, University of Minnesota. $2.75

DAVIS. Materia Medica and Prescription Writing. $1.50

FIELD. Evacuant Medication. Cathartics and Emetics. $1.75

GORGAS. Dental Medicine. A Manual of Materia Medica and Therapeutics. 5th Edition, Revised. $4.00

MAYS. Therapeutic Forces; or, The Action of Medicine in the Light of Doctrine of Conservation of Force. $1.25

MAYS. Theine in the Treatment of Neuralgia. ½ bound, .50

NAPHEYS. Modern Therapeutics. 9th Revised Edition, Enlarged and Improved. In two handsome volumes. Edited by ALLEN J. SMITH, M.D., and J. AUBREY DAVIS, M.D.
Vol. I. General Medicine and Diseases of Children. $4.00
Vol. II. General Surgery, Obstetrics, and Diseases of Women. $4.00

POTTER. Hand-Book of Materia Medica, Pharmacy, and Therapeutics, including the Action of Medicines, Special Therapeutics, Pharmacology, etc., including over 600 Prescriptions and Formulæ. 6th Edition, Revised and Enlarged. With Thumb Index in each copy. Cloth, $4.50; Sheep, $5.50

POTTER. Compend of Materia Medica, Therapeutics, and Prescription Writing, with Special Reference to the Physiological Action of Drugs. 6th Revised and Improved Edition, based upon the U. S. P. 1890. .80; Interleaved, $1.25

SAYRE. Organic Materia Medica and Pharmacognosy. An Introduction to the Study of the Vegetable Kingdom and the Vegetable and Animal Drugs. Comprising the Botanical and Physical Characteristics, Source, Constituents, and Pharmacopeial Preparations. With chapters on Synthetic Organic Remedies, Insects Injurious to Drugs, and Pharmacal Botany. A Glossary and 543 Illustrations, many of which are original. $4.00

WARING. Practical Therapeutics. 4th Edition, Revised and Rearranged. Cloth, $2.00; Leather, $3.00

WHITE AND WILCOX. Materia Medica, Pharmacy, Pharmacology, and Therapeutics. 3d American Edition, Revised by REYNOLD W. WILCOX, M.A., M.D., LL.D. Clo., $2.75; Lea., $3.25

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

REESE. Medical Jurisprudence and Toxicology. A Text-Book for Medical and Legal Practitioners and Students. 4th Edition. Revised by HENRY LEFFMANN, M.D. Clo., $3.00; Leather, $3.50

"To the student of medical jurisprudence and toxicology it is invaluable, as it is concise, clear, and thorough in every respect."—*The American Journal of the Medical Sciences.*

MANN. Forensic Medicine and Toxicology. Illus. $6.50

MURRELL. What to Do in Cases of Poisoning. 7th Edition, Enlarged. $1.00

TANNER. Memoranda of Poisons. Their Antidotes and Tests. 7th Edition. .75

MICROSCOPY.

BEALE. The Use of the Microscope in Practical Medicine. For Students and Practitioners, with Full Directions for Examining the Various Secretions, etc., by the Microscope. 4th Ed. 500 Illus. $6.50

BEALE. How to Work with the Microscope. A Complete Manual of Microscopical Manipulation, containing a Full Description of many New Processes of Investigation, with Directions for Examining Objects Under the Highest Powers, and for Taking Photographs of Microscopic Objects. 5th Edition. 400 Illustrations, many of them colored. $6.50

CARPENTER. The Microscope and Its Revelations. 7th Edition. 800 Illustrations and many Lithographs. $5.50

LEE. The Microtomist's Vade Mecum. A Hand-Book of Methods of Microscopical Anatomy. 887 Articles. 4th Edition, Enlarged. *Just Ready.* $4.00

MACDONALD. Microscopical Examinations of Water and Air. 25 Lithographic Plates, Reference Tables, etc 2d Edition. $2.50

REEVES. Medical Microscopy, including Chapters on Bacteriology, Neoplasms, Urinary Examination, etc. Numerous Illustrations, some of which are printed in colors. $2.50

WETHERED. Medical Microscopy. A Guide to the Use of the Microscope in Practical Medicine. 100 Illustrations. $2.00

MISCELLANEOUS.

BLACK. Micro-Organisms. The Formation of Poisons. A Biological Study of the Germ Theory of Disease. .75

BURNETT. Foods and Dietaries. A Manual of Clinical Dietetics. 2d Edition. $1.50

GOULD. Borderland Studies. Miscellaneous Addresses and Essays. 12mo. $2.00

GOWERS. The Dynamics of Life. .75

HAIG. Causation of Disease by Uric Acid. A Contribution to the Pathology of High Arterial Tension, Headache, Epilepsy, Gout, Rheumatism, Diabetes, Bright's Disease, etc. 3d Edition. $3.00

HARE. Mediastinal Disease. Illustrated by six Plates. $2.00

HEMMETER. Diseases of the Stomach. Illus. *In Press.*

HENRY. A Practical Treatise on Anemia. Half Cloth, .50

LEFFMANN. The Coal-Tar Colors. With Special Reference to their Injurious Qualities and the Restrictions of their Use. A Translation of Theodore Weyl's Monograph. $1.25

TREVES. Physical Education: Its Effects, Methods, Etc. .75

LIZARS. The Use and Abuse of Tobacco. .40

PARRISH. Alcoholic Inebriety from a Medical Standpoint, with Cases. $1.00

ST. CLAIR. Medical Latin. $1.00

NERVOUS DISEASES.

BEEVOR. Diseases of the Nervous System and their Treatment. *In Press.*

GOWERS. Manual of Diseases of the Nervous System. A Complete Text-Book. 2d Edition, Revised, Enlarged, and in many parts Rewritten. With many new Illustrations. Two volumes.
Vol. I. Diseases of the Nerves and Spinal Cord. Clo. $3.00; Sh. $4.00
Vol. II. Diseases of the Brain and Cranial Nerves; General and Functional Disease. Cloth, $4.00; Sheep, $5.00

GOWERS. Syphilis and the Nervous System. $1.00

GOWERS. Diagnosis of Diseases of the Brain. 2d Edition. Illustrated. $1.50

GOWERS. Clinical Lectures. A New Volume of Essays on the Diagnosis, Treatment, etc., of Diseases of the Nervous System. $2.00

GOWERS. Epilepsy and Other Chronic Convulsive Diseases. 2d Edition. *In Press.*

HORSLEY. The Brain and Spinal Cord. The Structure and Functions of. Numerous Illustrations. $2.50

OBERSTEINER. The Anatomy of the Central Nervous Organs. A Guide to the Study of their Structure in Health and Disease. 198 Illustrations. $5.50

ORMEROD. Diseases of the Nervous System. 66 Wood Engravings. $1.00

OSLER. Cerebral Palsies of Children. A Clinical Study. $2.00

OSLER. Chorea and Choreiform Affections. $2.00

PAGE. Railroad Injuries. With Special Reference to Those of the Back and Nervous System. $2.25

PRESTON. Hysteria and Certain Allied Conditions. Their Nature and Treatment. Illustrated. *In Press.*

THORBURN. Surgery of the Spinal Cord. Illustrated. $4.00

WATSON. Concussions. An Experimental Study of Lesions Arising from Severe Concussions. Paper cover, $1.00

WOOD. Brain Work and Overwork. .40

NURSING.

Special Catalogue of Books for Nurses sent free upon application.

BROWN. Elementary Physiology for Nurses. .75

CANFIELD. Hygiene of the Sick-Room. A Book for Nurses and Others. Being a Brief Consideration of Asepsis, Antisepsis, Disinfection, Bacteriology, Immunity, Heating and Ventilation, and Kindred Subjects for the Use of Nurses and Other Intelligent Women. $1.25

CULLINGWORTH. A Manual of Nursing, Medical and Surgical. 3d Edition with Illustrations. .75

CULLINGWORTH. A Manual for Monthly Nurses. 3d Ed. .40

CUFF. Lectures to Nurses on Medicine. 25 Illustrations. $1.00

DOMVILLE. Manual for Nurses and Others Engaged in Attending the Sick. 8th Edition. With Recipes for Sick-room Cookery, etc. .75

FULLERTON. Obstetric Nursing. 40 Ills. 4th Ed. $1.00

FULLERTON. Nursing in Abdominal Surgery and Diseases of Women. Comprising the Regular Course of Instruction at the Training-School of the Women's Hospital, Philadelphia. 2d Edition. 70 Illustrations. $1.50

HUMPHREY. A Manual for Nurses. Including General Anatomy and Physiology, Management of the Sick-Room, etc. 15th Edition. Illustrated. $1.00

SHAWE. Notes for Visiting Nurses, and all those Interested in the Working and Organization of District, Visiting, or Parochial Nurse Societies. With an Appendix Explaining the Organization and Working of Various Visiting and District Nurse Societies, by Helen C. Jenks, of Philadelphia. $1.00

STARR. The Hygiene of the Nursery. Including the General Regimen and Feeding of Infants and Children, and the Domestic Management of the Ordinary Emergencies of Early Life, Massage, etc. 5th Edition. 25 Illustrations. *Just Ready.* $1.00

TEMPERATURE CHARTS. For Recording Temperature, Respiration, Pulse, Day of Disease, Date, Age, Sex, Occupation, Name, etc. Put up in pads of fifty. Each .50

VOSWINKEL. Surgical Nursing. 111 Illustrations. $1.00

*** *Special Catalogue of Books on Nursing free upon application.*

OBSTETRICS.

BAR. Antiseptic Midwifery. The Principles of Antiseptic Methods Applied to Obstetric Practice. Authorized Translation by HENRY D. FRY, M.D., with an Appendix by the Author. $1.00

CAZEAUX AND TARNIER. Midwifery. With Appendix by MUNDÉ. The Theory and Practice of Obstetrics, including the Diseases of Pregnancy and Parturition, Obstetrical Operations, etc. 8th Edition. Illustrated by Chromo-Lithographs, Lithographs, and other full-page Plates, seven of which are beautifully colored, and numerous Wood Engravings. Cloth, $4.50; Full Leather, $5.50

DAVIS. A Manual of Obstetrics. Being a Complete Manual for Physicians and Students. 2d Edition. 16 Colored and other Plates and 134 other Illustrations. $2.00

JELLETT. The Practice of Midwifery. Illustrated. *In Press.*

LANDIS. Compend of Obstetrics. 5th Edition, Revised by WM. H. WELLS, Assistant Demonstrator of Clinical Obstetrics, Jefferson Medical College. With many Illustrations, .80; Interleaved, $1.25.

SCHULTZE. Obstetrical Diagrams. Being a series of 20 Colored Lithograph Charts, Imperial Map Size, of Pregnancy and Midwifery, with accompanying explanatory (German) text illustrated by Wood Cuts. 2d Revised Edition.
Price in Sheets, $26.00; Mounted on Rollers, Muslin Backs, $36.00

STRAHAN. Extra-Uterine Pregnancy. The Diagnosis and Treatment of Extra-Uterine Pregnancy. .75

WINCKEL. Text-Book of Obstetrics, Including the Pathology and Therapeutics of the Puerperal State. Authorized Translation by J. CLIFTON EDGAR, A.M., M.D. With nearly 200 Illustrations. Cloth, $5.00; Leather, $6.00

FULLERTON. Obstetric Nursing. 4th Ed. Illustrated. $1.00

SHIBATA. Obstetrical Pocket-Phantom with Movable Child and Pelvis. Letter Press and Illustrations. $1.00

PATHOLOGY.

BLACKBURN. Autopsies. A Manual of Autopsies Designed for the Use of Hospitals for the Insane and other Public Institutions. Ten full-page Plates and other Illustrations. $1.25

BLODGETT. Dental Pathology. By ALBERT N. BLODGETT, M.D., late Professor of Pathology and Therapeutics, Boston Dental College. 33 Illustrations. $1.25

GILLIAM. Pathology. A Hand-Book for Students. 47 Illus. .75

HALL. Compend of General Pathology and Morbid Anatomy. 91 very fine Illustrations. .80; Interleaved, $1.25

VIRCHOW. Post-Mortem Examinations. A Description and Explanation of the Method of Performing Them in the Dead House of the Berlin Charity Hospital, with Special Reference to Medico-Legal Practice. 3d Edition, with Additions. .75

PHARMACY.

Special Catalogue of Books on Pharmacy sent free upon application.

COBLENTZ. Manual of Pharmacy. A New and Complete Text-Book by the Professor in the New York College of Pharmacy. 2d Edition, Revised and Enlarged. 437 Illus. Cloth, $3.50; Sh., $4 50

BEASLEY. Book of 3100 Prescriptions. Collected from the Practice of the Most Eminent Physicians and Surgeons—English, French, and American. A Compendious History of the Materia Medica, Lists of the Doses of all the Officinal and Established Preparations, an Index of Diseases and their Remedies. 7th Ed. $2.00

BEASLEY. Druggists' General Receipt Book. Comprising a Copious Veterinary Formulary, Recipes in Patent and Proprietary Medicines, Druggists' Nostrums, etc.; Perfumery and Cosmetics, Beverages, Dietetic Articles and Condiments, Trade Chemicals, Scientific Processes, and an Appendix of Useful Tables. 10th Edition, Revised. $2.00

BEASLEY. Pocket Formulary. A Synopsis of the British and Foreign Pharmacopœias. Comprising Standard and Approved Formulæ for the Preparations and Compounds Employed in Medical Practice. 11th Edition. $2.00

PROCTOR. Practical Pharmacy. Lectures on Practical Pharmacy. With Wood Engravings and 32 Lithographic Fac-simile Prescriptions. 3d Edition, Revised, and with Elaborate Tables of Chemical Solubilities, etc. $3.00

ROBINSON. Latin Grammar of Pharmacy and Medicine. 2d Edition. With elaborate Vocabularies. $1.75

SAYRE. Organic Materia Medica and Pharmacognosy. An Introduction to the Study of the Vegetable Kingdom and the Vegetable and Animal Drugs. Comprising the Botanical and Physical Characteristics, Source, Constituents, and Pharmacopeial Preparations. With Chapters on Synthetic Organic Remedies, Insects Injurious to Drugs, and Pharmacal Botany. A Glossary and 543 Illustrations, many of which are original. Cloth, $4.00; Sheep, $5.00

SCOVILLE. The Art of Compounding. A Text-Book for the Student and a Reference Book for the Pharmacist. Cl. $2.50; Sh. $3.50

STEWART. Compend of Pharmacy. Based upon "Remington's Text-Book of Pharmacy." 5th Edition, Revised in Accordance with the U. S. Pharmacopœia, 1890. Complete Tables of Metric and English Weights and Measures. .80; Interleaved, $1.25

UNITED STATES PHARMACOPŒIA. 1890. 7th Decennial Revision. Cloth, $2.50 (postpaid, $2.77); Sheep, $3.00 (postpaid, $3.27); Interleaved, $4.00 (postpaid, $4.50); Printed on one side of page only, unbound, $3.50 (postpaid, $3.90).

Select Tables from the U. S. P. (1890). Being Nine of the Most Important and Useful Tables, Printed on Separate Sheets. Carefully put up in patent envelope. .25

WHITE AND WILCOX. Materia Medica, Pharmacy, Pharmacology, and Therapeutics. 3d American Edition. Revised by REYNOLD W. WILCOX, M.D., LL.D. Cloth, $2.75; Leather, $3.25

POTTER. Hand-Book of Materia Medica, Pharmacy, and Therapeutics. 600 Prescriptions and Formulæ. 6th Edition. Cloth, $4 50; Sheep, $5.50

*** *Special Catalogue of Books on Pharmacy free upon application.*

PHYSICAL DIAGNOSIS.

TYSON. Hand-Book of Physical Diagnosis. For Students and Physicians. By the Professor of Clinical Medicine in the University of Pennsylvania. Illus. 2d Ed., Improved and Enlarged. $1.25

MEMMINGER. Diagnosis by the Urine. 23 Illus. $1.00

PHYSIOLOGY.

BRUBAKER. Compend of Physiology. 8th Edition, Revised and Enlarged. Illustrated. .80; Interleaved, $1.25

KIRKE. Physiology. (14th Authorized Edition. Dark-Red Cloth.) A Hand-Book of Physiology. 14th Edition, Revised and Enlarged. By PROF. W. D HALLIBURTON, of Kings College, London. 661 Illustrations, some of which are printed in colors. *Just Ready.* Cloth, $3.25; Leather, $4.00

LANDOIS. A Text-Book of Human Physiology, Including Histology and Microscopical Anatomy, with Special Reference to the Requirements of Practical Medicine. 5th American, translated from the 9th German Edition, with Additions by WM. STIRLING, M.D.,D.SC. 845 Illus., many of which are printed in colors. *In Press.*

STARLING. Elements of Human Physiology. 100 Ills. $1.00

STIRLING. Outlines of Practical Physiology. Including Chemical and Experimental Physiology, with Special Reference to Practical Medicine. 3d Edition. 289 Illustrations. $2.00

TYSON. Cell Doctrine. Its History and Present State. $1.50

YEO. Manual of Physiology. A Text-Book for Students of Medicine. By GERALD F. YEO, M.D., F.R.C.S. 6th Edition. 254 Illustrations and a Glossary. Cloth, $2.50; Leather, $3.00

PRACTICE.

BEALE. On Slight Ailments; their Nature and Treatment. 2d Edition, Enlarged and Illustrated. $1.25

CHARTERIS. Practice of Medicine. 6th Edition. $2.00

FOWLER. Dictionary of Practical Medicine. By various writers. An Encyclopædia of Medicine. Clo., $3.00; Half Mor. $4.00

HUGHES. Compend of the Practice of Medicine. 5th Edition, Revised and Enlarged.

Part I. Continued, Eruptive, and Periodical Fevers, Diseases of the Stomach, Intestines, Peritoneum, Biliary Passages, Liver, Kidneys, etc., and General Diseases, etc.

Part II. Diseases of the Respiratory System, Circulatory System, and Nervous System; Diseases of the Blood, etc.
Price of each part, .80; Interleaved, $1.25

Physician's Edition. In one volume, including the above two parts, a Section on Skin Diseases, and an Index. 5th Revised, Enlarged Edition. 568 pp. Full Morocco, Gilt Edge, $2.25

ROBERTS. The Theory and Practice of Medicine. The Sections on Treatment are especially exhaustive. 9th Edition, with Illustrations. Cloth, $4.50; Leather, $5.50

TAYLOR. Practice of Medicine. Cloth, $2.00; Sheep, $2.50

TYSON. The Practice of Medicine. By JAMES TYSON, M.D., Professor of Clinical Medicine in the University of Pennsylvania. A Complete Systematic Text-book with Special Reference to Diagnosis and Treatment. Illustrated. 8vo. *Just Ready.*
Cloth, $5.50; Leather, $6 50; Half Russia, $7.50

PRESCRIPTION BOOKS.

BEASLEY. Book of 3100 Prescriptions. Collected from the Practice of the Most Eminent Physicians and Surgeons—English, French, and American. A Compendious History of the Materia, Medica, Lists of the Doses of all Officinal and Established Preparations, and an Index of Diseases and their Remedies. 7th Ed. $2.00

BEASLEY. Druggists' General Receipt Book. Comprising a Copious Veterinary Formulary, Recipes in Patent and Proprietary Medicines, Druggists' Nostrums, etc.; Perfumery and Cosmetics, Beverages, Dietetic Articles and Condiments, Trade Chemicals, Scientific Processes, and an Appendix of Useful Tables. 10th Edition, Revised. $2.00

BEASLEY. Pocket Formulary. A Synopsis of the British and Foreign Pharmacopœias. Comprising Standard and Approved Formulæ for the Preparations and Compounds Employed in Medical Practice. 11th Edition. Cloth, $2.00

PEREIRA. Prescription Book. Containing Lists of Terms, Phrases, Contractions, and Abbreviations Used in Prescriptions, Explanatory Notes, Grammatical Construction of Prescriptions, etc. 16th Edition. Cloth, .75; Tucks, $1.00

WYTHE. Dose and Symptom Book. The Physician's Pocket Dose and Symptom Book. Containing the Doses and Uses of all the Principal Articles of the Materia Medica and Officinal Preparations. 17th Ed. Cloth, .75; Leather, with Tucks and Pocket, $1.00

SKIN.

BULKLEY. The Skin in Health and Disease. Illustrated. .40

CROCKER. Diseases of the Skin. Their Description, Pathology, Diagnosis, and Treatment, with Special Reference to the Skin Eruptions of Children. 92 Illus. 2d Edition. Cloth, $4.50; Sh., $5.50

IMPEY. Leprosy. 37 Plates. 8vo. $3.50

VAN HARLINGEN. On Skin Diseases. A Practical Manual of Diagnosis and Treatment, with special reference to Differential Diagnosis. 3d Edition, Revised and Enlarged. With Formulæ and 60 Illustrations, some of which are printed in colors. $2.75

SURGERY AND SURGICAL DISEASES.

CAIRD AND CATHCART. Surgical Hand-Book. 5th Edition, Revised. 188 Illustrations. Full Red Morocco, $2.50

DEAVER. Appendicitis, Its Symptoms, Diagnosis, Pathology, Treatment, and Complications. Elaborately Illustrated with Colored Plates and other Illustrations. *Just Ready.* Cloth, $3.50

DEAVER. Surgical Anatomy. With 200 Illustrations, Drawn by a Special Artist from Directions made for the Purpose. *In Preparation.*

DULLES. What to Do First in Accidents and Poisoning. 4th Edition. New Illustrations. $1.00

HACKER. Antiseptic Treatment of Wounds, Introduction to the, According to the Method in Use at Professor Billroth's Clinic, Vienna. With a Photo-engraving of Billroth in his Clinic. .50

HEATH. Minor Surgery and Bandaging. 10th Ed Revised and Enlarged. 158 Illustrations, 62 Formulæ, Diet List, etc $1.25

HEATH. Injuries and Diseases of the Jaws. 4th Edition. 187 Illustrations. $4 50

HEATH. Lectures on Certain Diseases of the Jaws. 64 Illustrations. Boards, .50

HORWITZ. Compend of Surgery and Bandaging, including Minor Surgery, Amputations, Fractures, Dislocations, Surgical Diseases, and the Latest Antiseptic Rules, etc., with Differential Diagnosis and Treatment. 5th Edition, very much Enlarged and Rearranged. 167 Illustrations, 98 Formulæ. Clo., .80; Interleaved, $1.25

JACOBSON. Operations of Surgery. Over 200 Illustrations. Cloth, $3.00; Leather, $4.00

JACOBSON. Diseases of the Male Organs of Generation. 88 Illustrations. $6.00

MACREADY. A Treatise on Ruptures. 24 Full-page Lithographed Plates and Numerous Wood Engravings. Cloth, $6.00

MAYLARD. Surgery of the Alimentary Canal. 134 Illus. $7.50

MOULLIN. Text-Book of Surgery. With Special Reference to Treatment. 3d American Edition. Revised and edited by JOHN B. HAMILTON, M.D., LL.D., Professor of the Principles of Surgery and Clinical Surgery, Rush Medical College, Chicago. 623 Illustrations, over 200 of which are original, and many of which are printed in colors. Handsome Cloth, $6.00; Leather, $7.00

"The aim to make this valuable treatise practical by giving special attention to questions of treatment has been admirably carried out. Many a reader will consult the work with a feeling of satisfaction that his wants have been understood, and that they have been intelligently met."—*The American Journal of Medical Science.*

SMITH. Abdominal Surgery. Being a Systematic Description of all the Principal Operations. 224 Illus. 5th Ed. 2 Vols. Clo., $10.00

SWAIN. Surgical Emergencies. Fifth Edition. Cloth, $1.75

VOSWINKEL. Surgical Nursing. 111 Illustrations. $1.00

WALSHAM. Manual of Practical Surgery. 5th Ed., Revised and Enlarged. With 380 Engravings. Clo., $2.75; Lea., $3.25

WATSON. On Amputations of the Extremities and Their Complications. 250 Illustrations. $5.50

THROAT AND NOSE (see also Ear).

COHEN. The Throat and Voice. Illustrated. .40

HALL. Diseases of the Nose and Throat. Two Colored Plates and 59 Illustrations. $2.50

HUTCHINSON. The Nose and Throat. Including the Nose, Naso-Pharynx, Pharynx, and Larynx. Illustrated by Lithograph Plates and 40 other Illustrations. 2d Edition. *In Press.*

MACKENZIE. The Pharmacopœia of the London Hospital for Diseases of the Throat. 5th Edition, Revised by Dr. F. G. HARVEY. $1.00

McBRIDE. Diseases of the Throat, Nose, and Ear. A Clinical Manual. With colored Illus. from original drawings. 2d Ed. $6.00

MURRELL. Chronic Bronchitis and its Treatment. (Authorized Edition.) A Clinical Study. $1.50

POTTER. Speech and its Defects. Considered Physiologically, Pathologically, and Remedially. $1.00

WOAKES. Post-Nasal Catarrh and Diseases of the Nose Causing Deafness. 26 Illustrations. $1.00

URINE AND URINARY ORGANS.

ACTON. The Functions and Disorders of the Reproductive Organs in Childhood, Youth, Adult Age, and Advanced Life, Considered in their Physiological, Social, and Moral Relations. 8th Edition. $1.75

ALLEN. Albuminous and Diabetic Urine. Illus. $2.25

BROCKBANK. Gall Stones. *Just Ready.* $2.25

BEALE. One Hundred Urinary Deposits. On eight sheets, for the Hospital, Laboratory, or Surgery. Paper, $2.00

HOLLAND. The Urine, the Gastric Contents, the Common Poisons, and the Milk. Memoranda, Chemical and Microscopical, for Laboratory Use. Illustrated and Interleaved. 5th Ed. $1.00

LEGG. On the Urine. 7th Edition, Enlarged. Illus. $1.00

MEMMINGER. Diagnosis by the Urine. 23 Illus. $1.00

MOULLIN. Enlargement of the Prostate. Its Treatment and Radical Cure. Illustrated. $1.50

THOMPSON. Diseases of the Urinary Organs. 8th Ed. $3.00

TYSON. Guide to Examination of the Urine. For the Use of Physicians and Students. With Colored Plate and Numerous Illustrations engraved on wood. 9th Edition, Revised. $1.25

VAN NUYS. Chemical Analysis of Healthy and Diseased Urine, Qualitative and Quantitative. 39 Illustrations. $1.00

VENEREAL DISEASES.

COOPER. Syphilis. 2d Edition, Enlarged and Illustrated with 20 full-page Plates. $5.00

GOWERS. Syphilis and the Nervous System. 1.00

JACOBSON. Diseases of the Male Organs of Generation. 88 Illustrations. $6.00

VETERINARY.

ARMATAGE. The Veterinarian's Pocket Remembrancer. Being Concise Directions for the Treatment of Urgent or Rare Cases, Embracing Semeiology, Diagnosis, Prognosis, Surgery, Treatment, etc. 2d Edition. Boards, $1.00

BALLOU. Veterinary Anatomy and Physiology. 29 Graphic Illustrations. .80; Interleaved, $1.25

TUSON. Veterinary Pharmacopœia. Including the Outlines of Materia Medica and Therapeutics. 5th Edition. $2.25

WOMEN, DISEASES OF.

BYFORD (H. T.). Manual of Gynecology. With 234 Illustrations, many of which are from original drawings. $2 50

BYFORD (W. H.). Diseases of Women. 4th Edition. 306 Illustrations. Cloth, $2.00; Leather, $2.50

DÜHRSSEN. A Manual of Gynecological Practice. 105 Illustrations. $1.50

LEWERS. Diseases of Women. 146 Illus. 3d Edition. $2.00

WELLS. Compend of Gynecology. Illus. .80; Interleaved, $1.25

WINCKEL. Diseases of Women. Translated by special authority of Author, under the Supervision of, and with an Introduction by, THEOPHILUS PARVIN, M.D. 152 Engravings on Wood. 3d Edition, Revised. *In Preparation.*

FULLERTON. Nursing in Abdominal Surgery and Diseases of Women. 2d Edition. 70 Illustrations. $1.50

COMPENDS.

From The Southern Clinic.

"We know of no series of books issued by any house that so fully meets our approval as these ?Quiz-Compends?. They are well arranged, full, and concise, and are really the best line of text-books that could be found for either student or practitioner."

BLAKISTON'S ?QUIZ-COMPENDS?

The Best Series of Manuals for the Use of Students.

Price of each, Cloth, .80. Interleaved, for taking Notes, $1.25.

☞ These Compends are based on the most popular text-books and the lectures of prominent professors, and are kept constantly revised, so that they may thoroughly represent the present state of the subjects upon which they treat.

☞ The authors have had large experience as Quiz-Masters and attaches of colleges, and are well acquainted with the wants of students.

☞ They are arranged in the most approved form, thorough and concise, containing over 600 fine illustrations, inserted wherever they could be used to advantage.

☞ Can be used by students of *any* college.

☞ They contain information nowhere else collected in such a condensed, practical shape. **Illustrated Circular free.**

No. 1. **POTTER. HUMAN ANATOMY. Fifth** Revised and Enlarged Edition. Including Visceral Anatomy. Can be used with either Morris's or Gray's Anatomy. 117 Illustrations and 16 Lithographic Plates of Nerves and Arteries, with Explanatory Tables, etc. By SAMUEL O. L. POTTER, M.D., Professor of the Practice of Medicine, Cooper Medical College, San Francisco; late A. A. Surgeon, U. S. Army.

No. 2. **HUGHES. PRACTICE OF MEDICINE. Part I. Fifth** Edition, Enlarged and Improved. By DANIEL E. HUGHES, M.D., Physician-in-Chief, Philadelphia Hospital, late Demonstrator of Clinical Medicine, Jefferson Medical College, Phila.

No. 3. **HUGHES. PRACTICE OF MEDICINE. Part II. Fifth** Edition, Revised and Improved. Same author as No. 2.

No. 4. **BRUBAKER. PHYSIOLOGY. Eighth** Edition, with new Illustrations and a table of Physiological Constants. Enlarged and Revised. By A. P. BRUBAKER, M.D., Professor of Physiology and General Pathology in the Pennsylvania College of Dental Surgery; Demonstrator of Physiology, Jefferson Medical College, Philadelphia.

No. 5. **LANDIS. OBSTETRICS. Fifth** Edition. By HENRY G. LANDIS, M.D. Revised and Edited by WM. H. WELLS, M.D., Assistant Demonstrator of Obstetrics, Jefferson Medical College, Philadelphia. Enlarged. 47 Illustrations.

No. 6. **POTTER. MATERIA MEDICA, THERAPEUTICS, AND PRESCRIPTION WRITING. Sixth** Revised Edition (U. S. P. 1890). By SAMUEL O. L. POTTER, M.D., Professor of Practice, Cooper Medical College, San Francisco; late A. A. Surgeon, U. S. Army.

? QUIZ-COMPENDS ?—Continued.

No. 7. WELLS. GYNECOLOGY. A New Book. By WM. H. WELLS, M D., Assistant Demonstrator of Obstetrics, Jefferson College, Philadelphia. Illustrated. *Just Ready.*

No. 8. GOULD AND PYLE. DISEASES OF THE EYE AND REFRACTION. A New Book. Including Treatment and Surgery. By GEORGE M. GOULD, M.D., and W. L. PYLE, M.D. With Formulæ and Illustrations.

No. 9. HORWITZ. SURGERY, Minor Surgery, and Bandaging. Fifth Edition, Enlarged and Improved. By ORVILLE HORWITZ, B. S., M.D., Clinical Professor of Genito-Urinary Surgery and Venereal Diseases in Jefferson Medical College; Surgeon to Philadelphia Hospital, etc. With 98 Formulæ and 71 Illustrations.

No. 10. LEFFMANN. MEDICAL CHEMISTRY. Fourth Edition. Including Urinalysis, Animal Chemistry, Chemistry of Milk, Blood, Tissues, the Secretions, etc. By HENRY LEFFMANN, M D., Professor of Chemistry in Pennsylvania College of Dental Surgery and in the Woman's Medical College, Philadelphia.

No. 11. STEWART. PHARMACY. Fifth Edition. Based upon Prof Remington's Text-Book of Pharmacy. By F. E. STEWART, M D., PH.G., late Quiz-Master in Pharmacy and Chemistry, Philadelphia College of Pharmacy; Lecturer at Jefferson Medical College. Carefully revised in accordance with the new U. S. P.

No. 12. BALLOU. VETERINARY ANATOMY AND PHYSIOLOGY. Illustrated. By WM. R. BALLOU, M.D., Professor of Equine Anatomy at New York College of Veterinary Surgeons; Physician to Bellevue Dispensary, etc. 29 graphic Illustrations.

No. 13. WARREN. DENTAL PATHOLOGY AND DENTAL MEDICINE. Second Edition, Illustrated. Containing all the most noteworthy points of interest to the Dental Student and a Section on Emergencies. By GEO. W. WARREN, D.D.S., Chief of Clinical Staff, Pennsylvania College of Dental Surgery, Philadelphia.

No. 14. HATFIELD. DISEASES OF CHILDREN. Second Edition. **Colored Plate.** By MARCUS P. HATFIELD, Professor of Diseases of Children, Chicago Medical College.

No. 15. HALL. GENERAL PATHOLOGY AND MORBID ANATOMY. 91 Illustrations. By H. NEWBERRY HALL, PH.G., M.D., Professor of Pathology and Med. Chem., Chicago Post-Graduate Medical School; Mem. Surgical Staff, Illinois Charitable Eye and Ear Infirmary; Chief of Ear Clinic, Chicago Med. College.

Price, each, Cloth, .80. Interleaved, for taking Notes, $1.25.

Handsome Illustrated Circular sent free upon application.

In preparing, revising, and improving BLAKISTON'S ? QUIZ-COMPENDS ? the particular wants of the student have always been kept in mind.

Careful attention has been given to the construction of each sentence, and while the books will be found to contain an immense amount of knowledge in small space, they will likewise be found easy reading; there is no stilted repetition of words; the style is clear, lucid, and distinct. The arrangement of subjects is systematic and thorough; there is a reason for every word. They contain over 600 illustrations.

Tyson's Practice of Medicine.

Illustrated. Just Ready.

A Text-Book of the Practice of Medicine. With Special Reference to Diagnosis and Treatment. By JAMES TYSON, M. D., Professor of Clinical Medicine in the University of Pennsylvania; Physician to the Hospital of the University and to the Philadelphia Hospital; Fellow of the College of Physicians of Philadelphia, etc.

With Many Useful Illustrations.

Octavo. 1180 Pages.

Cloth, \$5.50; Sheep, \$6.50; Half Russia, \$7.50.

Dr. Tyson's qualifications for writing such a work are unequaled. It is really the outcome of over thirty years' experience in teaching and in private and hospital practice. As a teacher he has, while devoting himself chiefly to clinical medicine, occupied several important chairs, an experience that has necessarily widened his point of view and added weight to his judgment.

As an author Dr. Tyson has been more than usually successful, and by his book on "Examination of Urine," many thousands of which have been sold, has become known throughout the English-speaking world. The success of this little book lies in the fact that it is concise, simple, direct, broad. It furnishes the desired information and then stops. The same style has been largely used in the present work, and must be appreciated by the busy man and student.

Descriptive circular and sample pages upon application.